The Heating and Ventilating Magazine

A MONTHLY JOURNAL OF ENGINEERING PROGRESS

Vol. XVIII. No. 8
$2.00 a year 20 cents a copy

AUGUST, 1921

New York Office, 1123 Broadway
Published at Cooperstown, N. Y.

ECONOMY PUMPS
USED IN

The Versailles

Economy Centrifugal Vacuum and Boiler Feed Pumps are important items in the mechanical equipment of this exclusive and finely appointed building. These pumps are automatic and are installed in duplicate for relay operation.

The selection of Economy Pumps was made because it was desired to carry boiler pressure below atmospheric with never varying inside temperature. In buildings like this which must attract their patronage by the comforts offered during the winter, it is becoming common practice to specify Economy products. The Versailles is also equipped with Economy House Pumps and Sewage Ejectors. The installation is by H. P. Reger & Co., Contracting Engineers.

ECONOMY PRODUCTS

Condensation Pumps
Vacuum
Bilge
Sewage
Boiler Feed
Circulating
House
Centrifugal
Sewage Ejectors
Cellar Drainers
Water Systems
Catch Basins
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ECONOMY PUMPING MACHINERY CO.

120-126 No. CURTIS ST.
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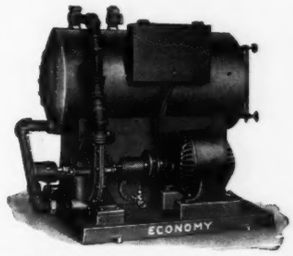
REPRESENTED BY SELLING ENGINEERS
IN ALL CITIES AND LARGE TOWNS



COMPLETE CENTRIFUGAL VACUUM
AND BOILER FEED UNIT.

CLARAGE
KALAMAZOO
BLOWERS-FANS-ENGINES

Architects and Engineers
Warren & Wetmore
New York City

General Contractors
Thompson-Starrett Co.
New York City

THE STRAUS BUILDING
Fifth Avenue at 46th Street, New York City

Equipped with Clarage-Kalamazoo Multiblade Fans

Stately in design, majestic in appearance it stands—the new home of S. W. Straus & Co. on Fifth Avenue at 46th Street. This building, an architectural feast from without, is, likewise, a marvel for health and comfort within.

One admirable feature is the ventilating system in which CLARAGE-KALAMAZOO MULTIBLADE FANS are used. Day in and day out, winter and summer, the occupants of the Straus Building are assured an abundance of good, clean, pure air.

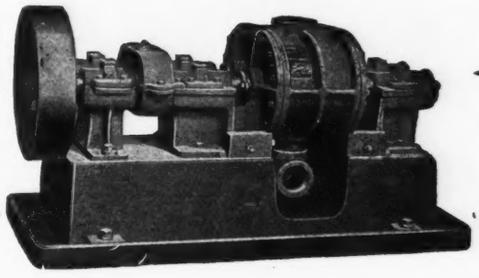
Clarage equipment is used for ventilating and heating industrial plants and public buildings of all kinds. For your convenience in securing ready information about our products, we are represented in Sweet's Catalogue. Detailed information is found in our catalogue 51. Send for it today!

CLARAGE FAN COMPANY

414-420 Porter Street, Kalamazoo, Michigan

Manufacturers of Fans, Blowers, Heaters, Engines, Etc.

Economy



Service

Economy in a vacuum heating system is determined to a greater extent by service than by first cost. Users of Connersville Vacuum Pumps have found that with little attention they continue to run year after year, giving the same dependable service, each succeeding season.

The Connersville Blower Company

Connersville Indiana U.S.A.

Chicago, Monadnock Block New York, 114 Liberty Street

Marsh Reflux Junior Thermostatic Traps

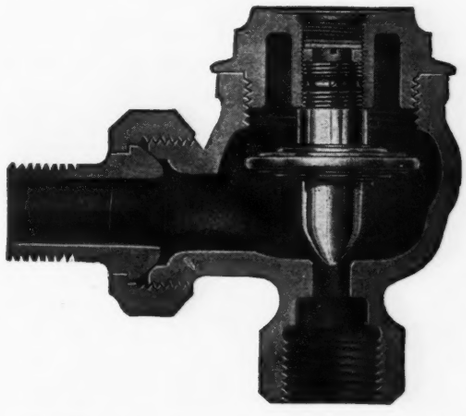
For Radiators and Coils of "Low Pressure," "Vapor" and "Vacuum Heating Systems"

FREELY DISCHARGES AIR AND WATER WITHOUT LOSS OF STEAM

THE Marsh REFLUX Return Line Trap is for use on the return end of radiators of low pressure, vapor or vacuum systems of heating. It is the result of a careful investigation into the actual requirements that must be fulfilled by a radiator return valve, in order that it may accomplish what is desired of it, namely, **to free the radiator of air and water without the loss of steam** and to do so **noiselessly.**

The Marsh Reflux Junior Thermostatic Trap is recommended for small radiators and coils. This Trap for the small and the Original Reflux for the large units will make an ideal job. Especially adaptable for two pipe gravity work and vapor systems.

May be furnished either sealed adjustment (as illustrated) or with outside adjustment.



Write for literature fully describing this Trap

JAS. P. MARSH & CO., 118-124 South Clinton Street, **Chicago**

Founded 1865

Manufacturers of Gauges for all Pressures **Automatic Air Valves and Steam Specialties**

Agents for Great Britain and Ireland: Chatterton & Co., 30 Fetter Lane, E. C. 4, London
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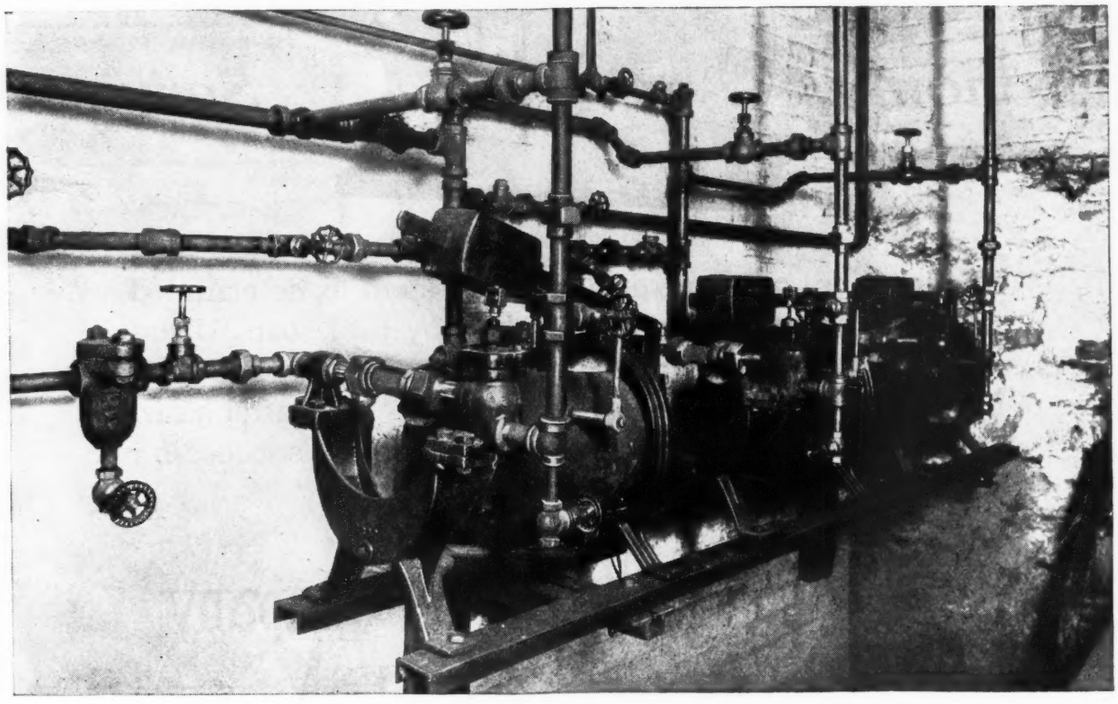

Save Coal!

Save Time!

Save Labor!

By the use of

CRANETILT STEAM TRAPS

The large discharging capacities effect an appreciable economy by delivering the condensation back to the boiler quickly.

Their discharging capacities are greater than any other style trap on the market.

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Ample Steam Space and Steady Water Line

Kewanee Boilers have large unbroken liberating surfaces. The steam has a chance to get up into the steam space of the boiler, and there is plenty of space for the steam.

This keeps the water line steady —and *keeps the water in the boiler* and out of the pipes and radiators.

If the kettle were full, with no space for the steam some of the water would gurgle out the spout.

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Steel Heating Boilers, Radiators, Tanks, Water Heating Garbage Burners

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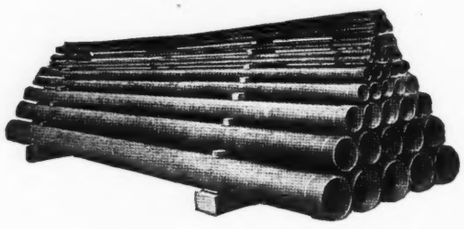

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FIRE PROTECTION
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Sole Distributors for this section of WM. POWELL CO.'S HIGH GRADE VALVES and DEPENDABLE ENGINEERING SPECIALTIES

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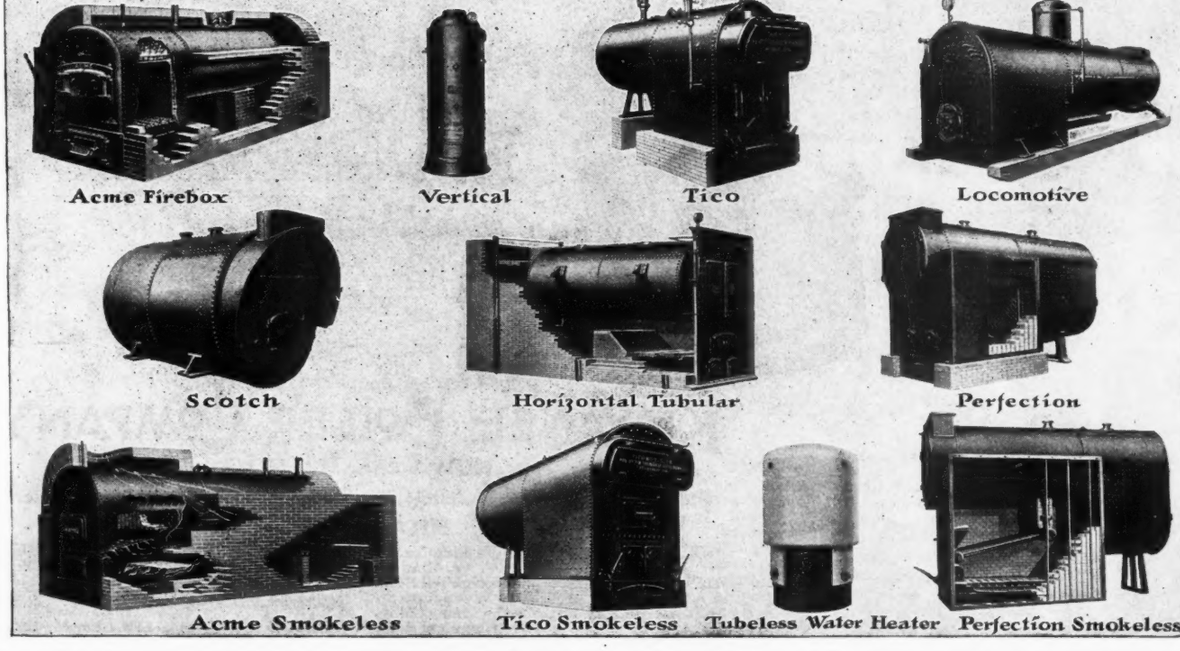
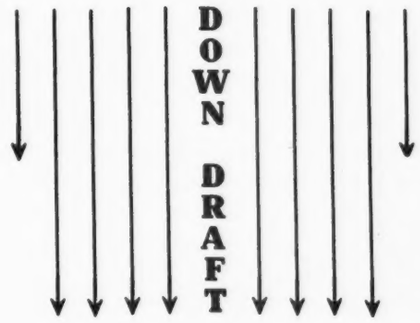


The Titusville Iron Works Company, Titusville, Penna. New York Office, 90 West Street; Buffalo Office, 821-23 Marine Trust Building; Pittsburg Office, Farmers Bank Building. Manufacturers of Firetube Steel Boilers for Power and Heating, Fronts, Grates, Castings, Smoke Stacks, Tanks, and Oil Well Boilers; Steam, Gas, Oil, and Gasoline Engines, Pumping Powers and Oil Well Machinery.

IMICO
Heating Boilers

Smokeless



For Water or Steam

Our Catalogue describing our complete line of Heating Apparatus sent on request

Illinois Malleable Iron Co.
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INTERNATIONAL
ECONOMY ROUND BOILERS

HOT WATER

Capacities 575 to 2,400 sq. ft. water radiation, based on 8-hr. firing periods.

THE long positive fire travel in the Economy Round Boiler takes place across the entire width of the boiler and forces the hot gases to impinge against every square inch of heating surface. In passing from one flue space to another they strike the surface above at right angles. This is far more effective than a staggered fire travel where the gases simply zig-zag from one section to another.

STEAM

Capacities 350 to 1,475 sq. ft. direct steam radiation, based on 8-hr. firing periods.

Other special features of the boiler are the large ash pit, sidedraft door, deep fuel bed, individual flue doors, and patented herring-bone triangular revolving grate.

Have you a copy of our new catalog which explains these and many other distinctive features? If not a post-card will bring it.

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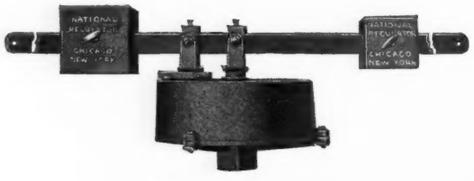
HOT WATER LOW PRESSURE

2" for Hot Water



7" for Low Pressure and Vapor

Made in 2", 4", 7" and 10" sizes

Metaphram Damper Regulators

For Low Pressure and Hot Water Boilers

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For Hot water Tanks, Ovens, Pots, Driers, Refrigeration and other industrial processes.

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SPENCER Magazine Feed HEATERS

Tell Your Customers They Can Use Cheap No. 1 Buckwheat Coal

YOUR customers want to cut their coal bills—you can turn that desire into sales by showing that the Spencer Heater will successfully burn the cheaper, smaller sizes of hard coal (No. 1 Buckwheat).

The Spencer not only saves 30% to 40% of the usual coal cost but maintains a more even heat for longer periods with less attention.

These features take the threat out of any future increases in coal costs. So you are able to show your customers a real investment that they will appreciate.

Moreover, the Standard Heater Company maintains a service, through its branch offices, that is exceptionally complete. We suggest that you give the office nearest you an opportunity to show you all the Spencer advantages from a selling point of view.

Successfully Burns No. 1 Buckwheat

NEW YORK BUFFALO
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STANDARD HEATER COMPANY
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Speed and Accuracy

A "TOLEDO" Portable Power Drive for geared pipe tools furnishes an operating speed five times faster than ratchet handle. "Toledo" Cutters and Threaders cut or thread with an accuracy that insures clean, square ends and perfectly tight joints. Get our catalog "F".

The Toledo Pipe Threading Machine Co.
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New York Office:
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TOLEDO DRIVE
PORTABLE POWER

Dependability

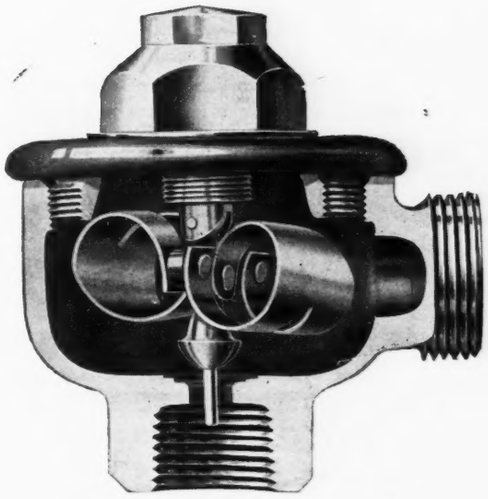
The engineer who is responsible for the maintenance of building equipment, and the owner who pays the maintenance costs, both know the dollars and cents value of dependability,—of mechanical equipment that they can depend on, and that does not depend on them for replacements, adjustments and repairs.

Radiator traps play a vital and important part in the efficient operation of the heating system. They must be dependable.

Permanent *all-metal* construction insures that the proven operation of Trane Thermetal Traps will continue for years and years, and architects and engineers who have investigated both the metal and the trap shave unhesitatingly adopted them.

May we send you some interesting and valuable data on radiator trap performance?

Ask for Bulletins No. 6 and No. 6-A



"The Trap Without a Diaphragm"

Established

LA CROSSE TRANE WISCONSIN

1883

THE TRANE COMPANY

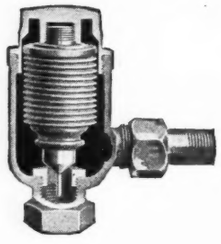
206 Cameron Avenue La Crosse, Wis

Chicago Boston New York Philadelphia
Washington, D. C. Salt Lake City Portland, Ore.

Trane Thermetal Traps

QUALITY SERVICE QUALITY

Heating Specialties that Last



The B & B Line

In specifying the B. & B. Line of Heating Specialties for vacuum systems and Temperature Control Systems you are assured of getting QUALITY-SERVICE and a Heating Specialty that will last.

The B. & B. Multiflex Trap and B. & B. Multiflex Modulation Valve, as illustrated, are metal throughout and contain a B. & B. Multiflex Wonder Bellows. Note the simplicity in construction of the Multiflex Modulation Valve.

Literature sent upon request.

B. & B. Vacu-Vapor System

B. & B. Return Line System

B. & B. Air Line System

B. & B. Temperature Control System

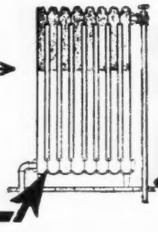
B. & B. High Pressure Specialties

THE BISHOP & BABCOCK COMPANY

General Offices and Factories, CLEVELAND, OHIO.

Steam Above

Air Below



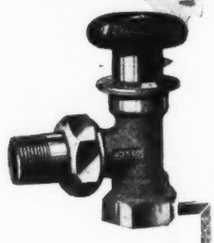
Save Several Shovels full of Coal a Day

WITH an Adsco Heating System you easily save 20 to 30% of your entire winter's fuel cost. Adsco makes this big saving by giving you absolute control of every ounce of steam used. The Adsco Graduated Radiator Valve—the only valve on the radiator—is used to admit just enough steam to fill any portion of the radiator desired. No overheating.

No radiator traps, return traps, air valves, vacuum pumps, or other complicated and unnecessary devices are used with Adsco Heating. Consequently its first and installation cost is 15 to 20% less than most heating systems.

Change over your hot water or other "coal-greedy" systems to Adsco. (Ask for Bulletin No. 147-H.)

Write for Bulletin No. 150-H which explains the fuel saving economies of Adsco Heating.



AMERICAN DISTRICT STEAM COMPANY

GENERAL OFFICES AND WORKS
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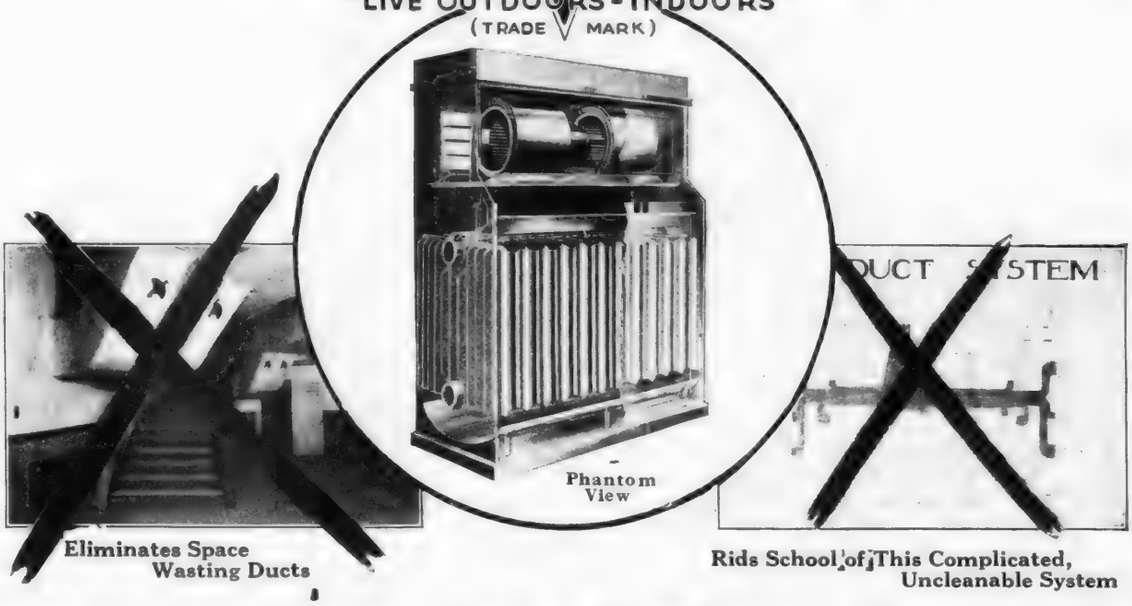
Ask about Adsco Heating of building groups from Central Station Steam Plant—Bulletin 20-H; for individual buildings, Bulletin 150-H.

ADSCO HEATING

UNIVENT

"LIVE OUTDOORS-INDOORS"
(TRADE MARK)



Phantom View

Eliminates Space Wasting Ducts

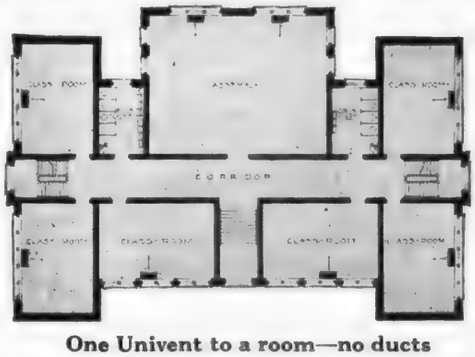
Rids School of This Complicated, Uncleanable System

For Schools... Banks... Lodge Buildings... Hospitals, etc.

Architects, contractors and engineers who install the Univent system of heating and ventilating in buildings can be sure that whenever they desire a letter of recommendation to a prospect they'll get it.

The Univent system has no cumbersome, space-wasting, uncleanable ducts and flues—its installation cuts building costs materially. Its operation is simplicity itself. You'll never have a comeback with the Univent—no after adjustments to hold up final payment. Investigate Univents.

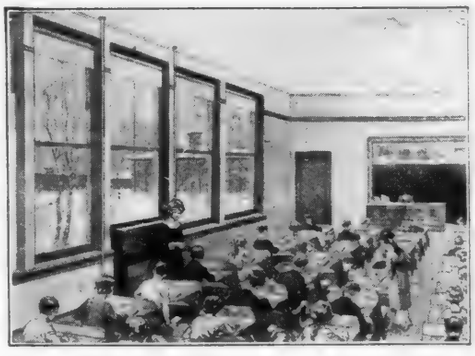
MOLINE, ILLINOIS



One Univent to a room—no ducts

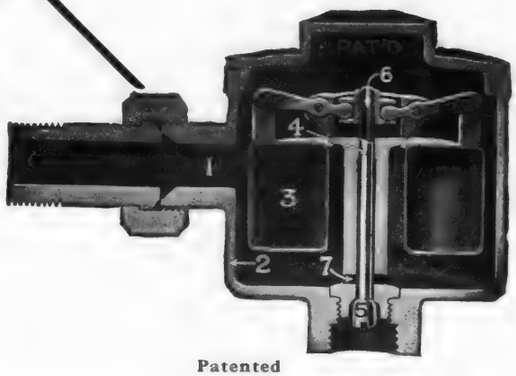
Write for Full Engineering Data

To contractors and engineers interested in this improved method of ventilation we will gladly send our catalogue and Engineering Data Book upon receipt of a request on your business stationery. Write Dept. F.



Classroom Showing Univent Installation —Note Size

A Steam Trap that Automatically Eliminates Air and Water Condensation Without Allowing Escape of Steam



Patented

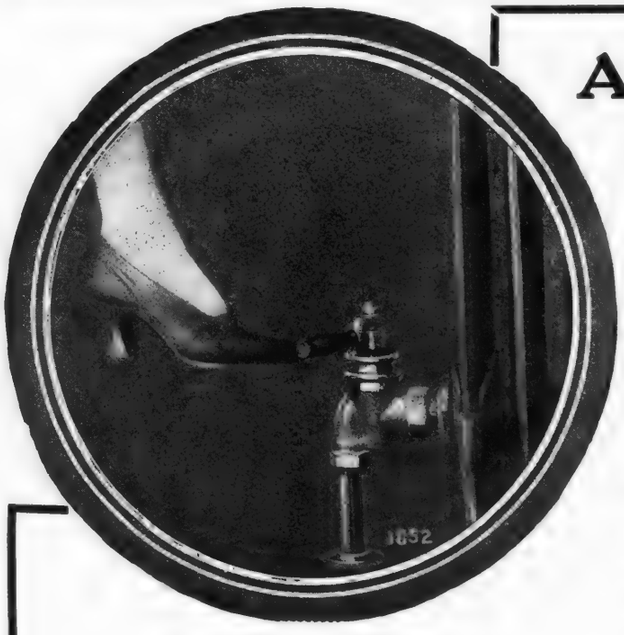
THE McDonald Under-Seat Valve is the only valve of its kind on the market. The principle of operation is positive and noiseless. It gives perfect service on any radiator on a two-pipe heating system and under any ordinary pressure up to ten pounds. Handles and discharges a much larger quantity of water than any other trap or valve of equal size. Self-cleaning. Carries away all scale. Entire inside instantly removable by loosening cap. Saves every ounce of steam. Its economical features are greatly appreciated by the building owner.

Leading architects, heating engineers and contractors are specifying and installing large numbers of the McDonald Under-Seat Valve, because its superior features have been proven in service.

Write for detailed information

The McDonald Under Seat Valve Co.

602 Swetland Building **CLEVELAND, OHIO**



No stooping—the slightest touch of the foot operates the valve

A Quarter Turn of the handle opens or closes the

GORTON

QUARTER-TURN

VALVE

It is the easiest operating valve in the world, and users will regulate heat in a room by opening and closing the radiators, saving steam.

With the old time valve requiring five or six turns of the wheel to open or close the valve users open the windows to cool a room, an immense waste of steam.

Wasted steam is wasted coal.

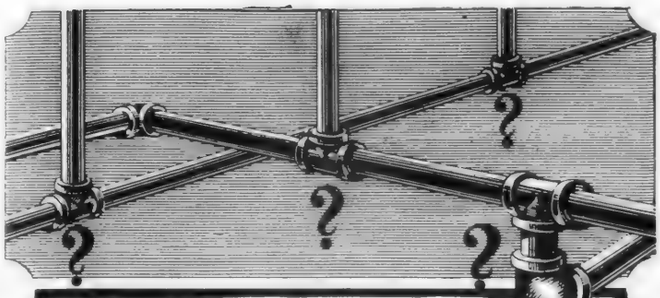
Equip your radiators with GORTON Valves and save money on your Coal Pile.

Write for Catalogue

Gorton & Lidgerwood Co.

Fisher Bldg., Chicago, Ill. **100 Liberty St., New York, N. Y.**

See Sweet's Architectural Catalogue, Page 1757, for Specifications



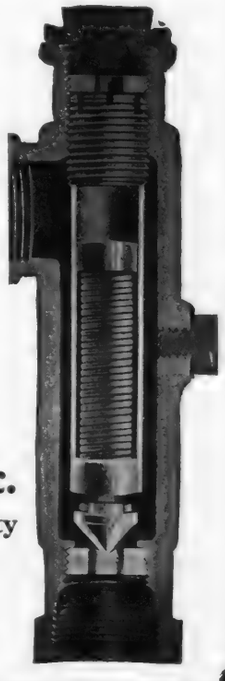
You're Wasting Coal If Your Steam Lines Are Not Thoroughly Trapped!

BECAUSE of the high cost of the "bucket" or "float" type of steam trap, many large plants are not equipped with a sufficient number of traps to take care of the condensate properly. A pretty poor policy, and one that is likely to prove very costly with bituminous coal selling up to $13.00 a ton. a ton.

To be properly trapped—and that means economically trapped—a steam system should have a trap at every point where condensate collects.

The low price of the Steam Trap Sarco enables you to buy three traps for the cost of one of the bucket or float type. In that way you can equip your lines with as many traps as are needed, at a low figure, and in that way save many tons of costly coal.

And that is not the only advantage of this trap. Built on the liquid expansion principle, it is free from the complicated mechanism found in other traps—mechanism which will get out of order and cost you money for repairs.



The Sarco closes promptly and prevents all loss of live steam. It returns condensate to the hot well while still hot.

Can be installed without supports or platform.

There are other exclusive features of a money saving kind which recommend the Steam Trap Sarco. These are fully described in our Booklet P-12. Write today for a copy and information about our free trial offer. No obligations.

SARCO CO., Inc.

231 Broadway, New York City

Ellicott Square, Buffalo
Majestic Building, Detroit
Monadnock Block, Chicago
Drexel Building, Philadelphia
6523 Euclid Ave., Cleveland

STEAM TRAP SARCO

Comfort with Economy

The primary requirements of a satisfactory heating system are that it shall provide comfortable warmth, readily adjustable, convenient to manipulate, and economical of fuel.

Webster

SYSTEMS OF STEAM HEATING

meet these requirements admirably as is being demonstrated in more than 17,000 installations of every size and type throughout the country.

Not only is each item of Webster equipment as nearly mechanically perfect as 33 years of experience can make it, but the cooperation of Webster engineers, offered through 31 branch offices to architects, engineers, contractors, and owners, helps to make each Webster installation a success in every way and a credit to all concerned.

144

Warren Webster & Company

Camden, N. J.

31 Branch Offices

Residence of Chas. W. Gates, Minneapolis, Minn., equipped with a Webster System of Steam Heating

Four dominant features of the Wright "Victor" Steam Trap are:

1—One large, special valve which handles floods of condensation or small amounts, automatically and continuously.

2—Operates perfectly under absolutely no pressure or any pressure up to 20 pounds.

3—Has straight line pipe connections through inlet and outlet so working parts can be removed without disturbing the piping.

4—The trap has no intricate parts. Valve is at the top where sediment can't reach it.

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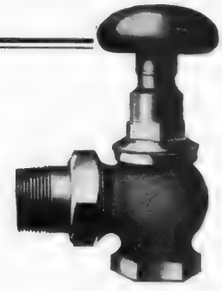

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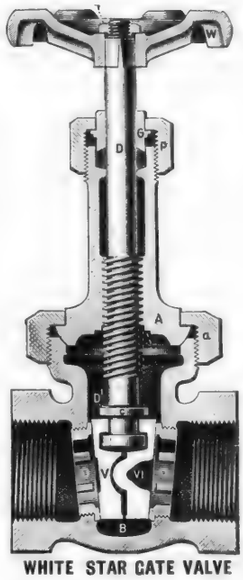

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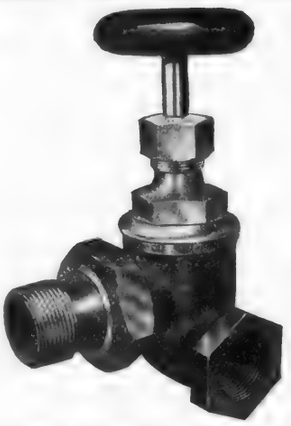

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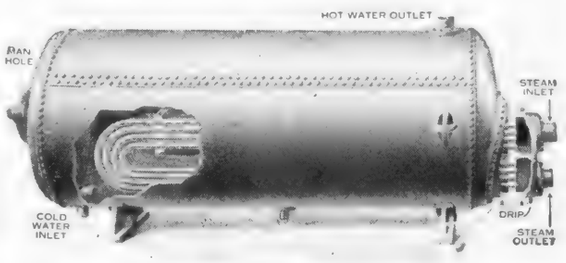

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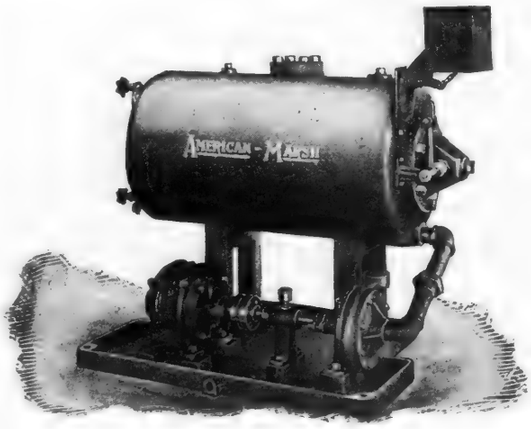

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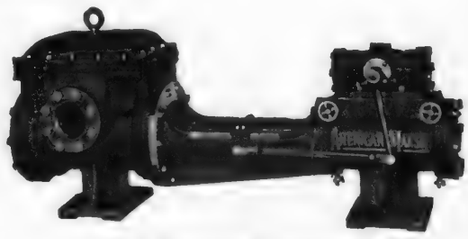

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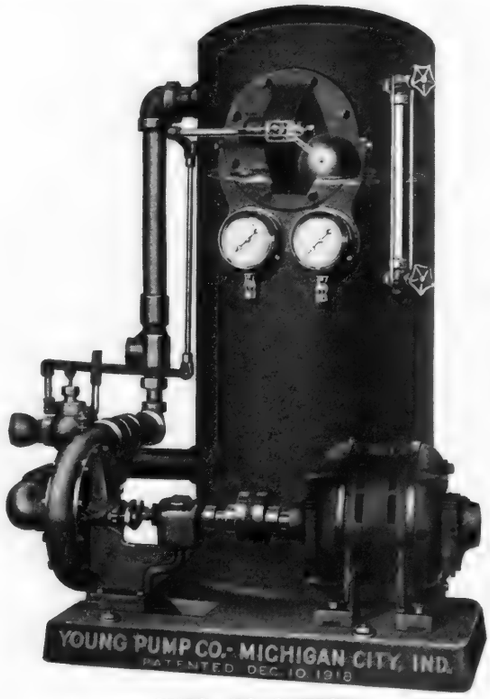

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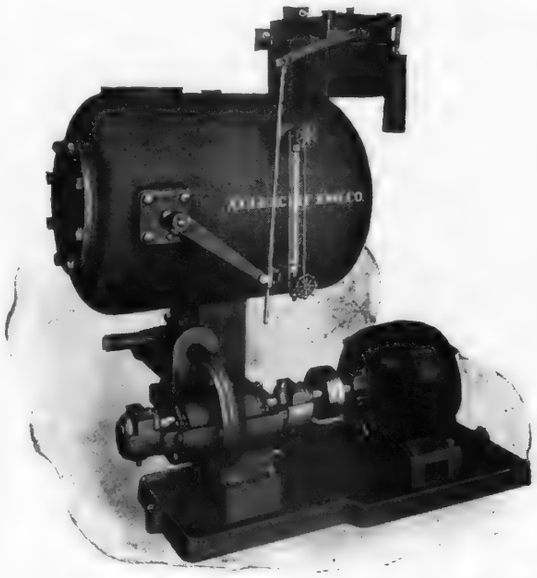

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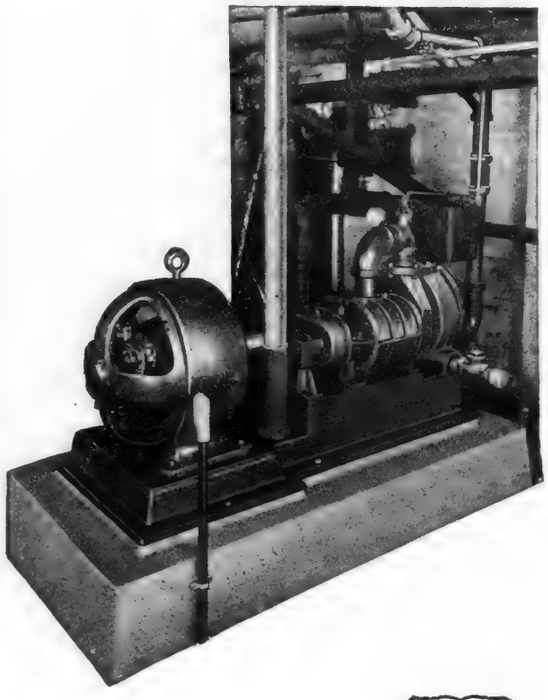

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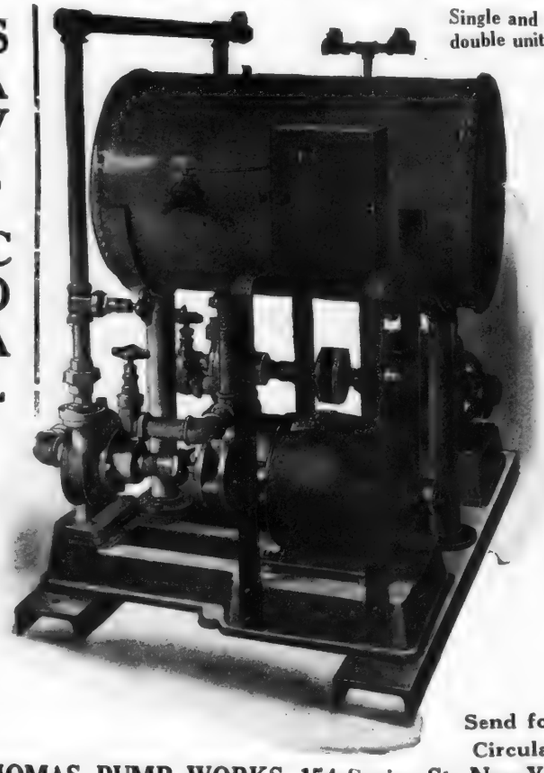

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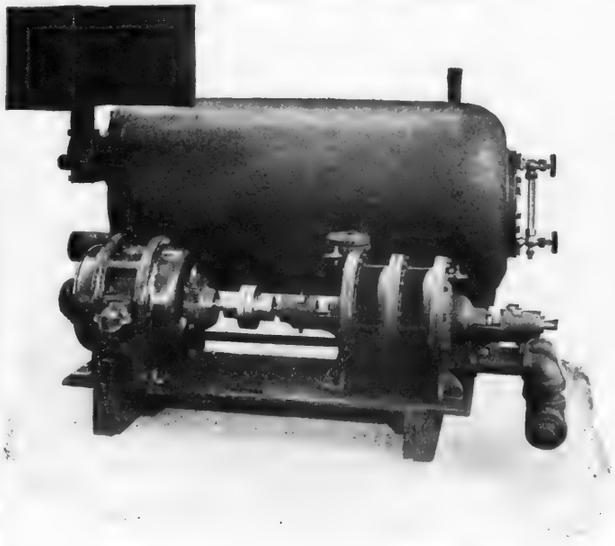

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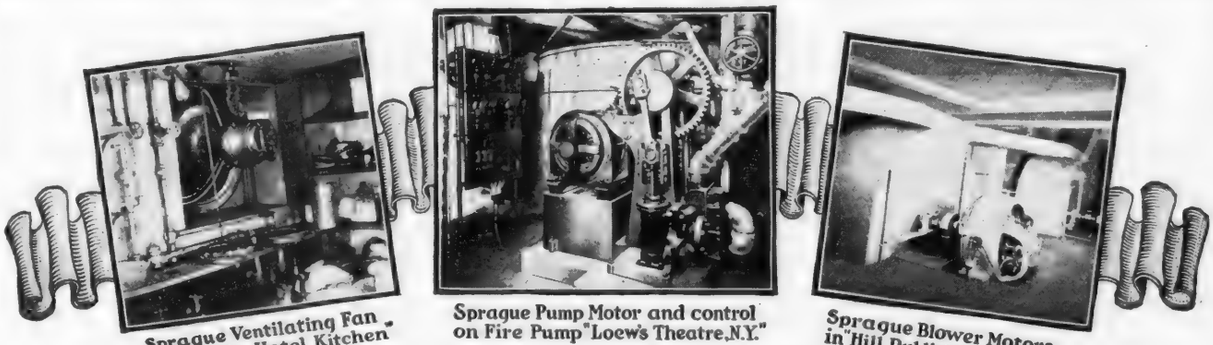

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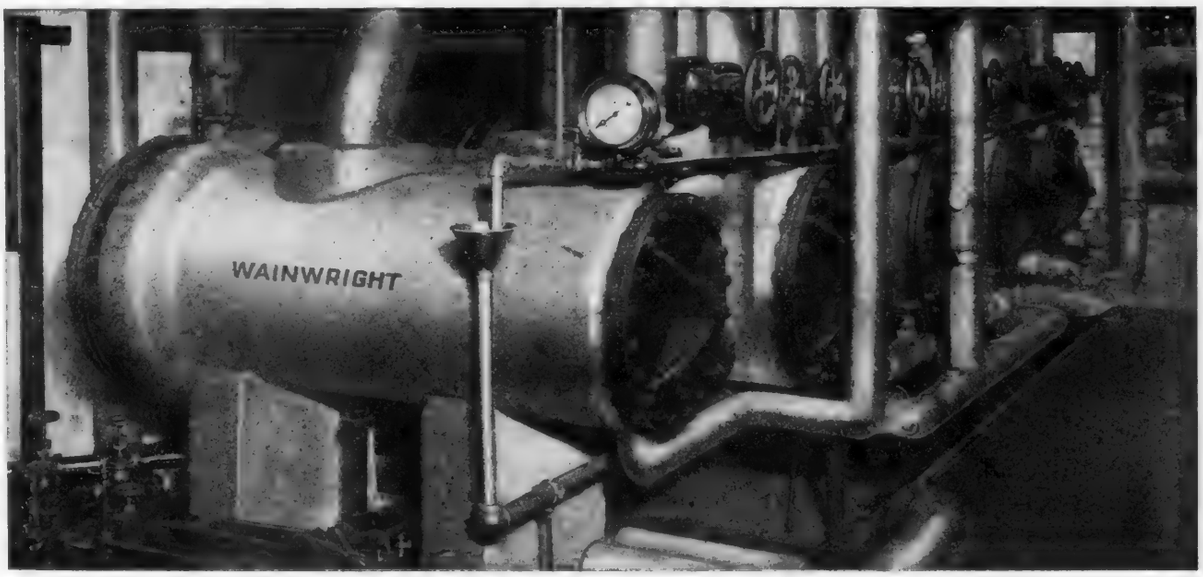

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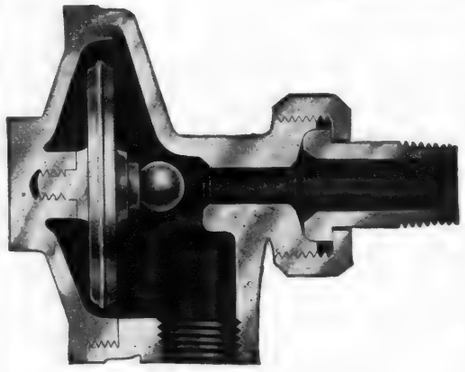

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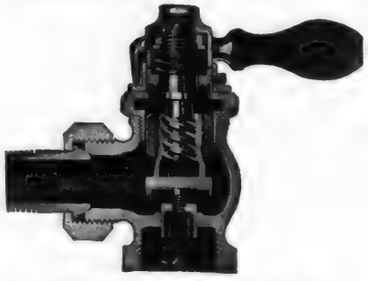

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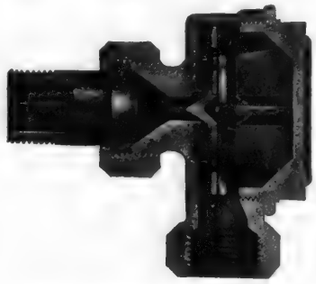

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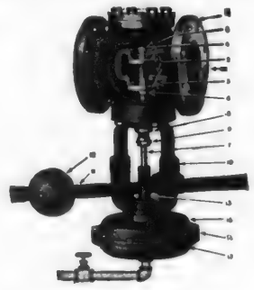

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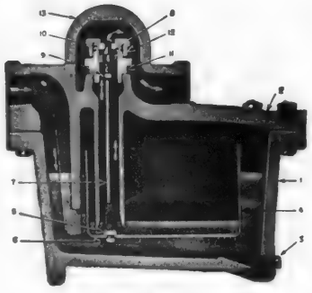

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Reversible Seat—Accessible

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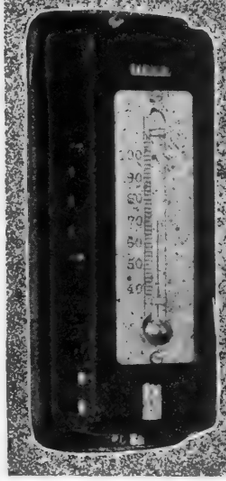

The All-Metal Apparatus

No Rubber Diaphragms in either Thermostats or Valves

The Only System Constructed of Nothing but Metal

JOHNSON SERVICE COMPANY
MILWAUKEE - U. S. A.

The Heating and Ventilating Magazine

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AUGUST, 1921

ADVANCED IDEAS APPLIED IN DESIGN OF A GRAVITY WATER HEATING SYSTEM

An Installation that Circulates Hot Water Through Supply Mains at All Times, Regardless of Number of Radiators in Service

By WILLIAM F. DEVENDORF.

THE usual arrangement of a water heating system in ordinary house work is to have the supply and return mains start low at the boiler and grade up to the far end. Both mains are of maximum size at the boiler, tapering off to a minimum at the far ends, the supply and return mains both grading up and being of the same size at any given point.

It is presumed that this method is ordinarily followed because it is the simplest to lay out and the simplest to install. It is, however, far from being an ideal plan and many "troubles" that have made the heating contractor gray-headed undoubtedly result from this arrangement of piping.

It is the purpose in the present article to describe a radical departure from the usual arrangement. The successful operation of this system lends special interest to some of the features in its design.

Referring to the piping plan (Fig. 1) it will be noted that the 6-in. supply main starts high at the boiler and crosses to the opposite side of the building with only one branch being taken off, this branch supplying a 320-sq. ft. indirect radiator. The 6-in. supply main divides at the end through a twin elbow into 4-in. mains, one supplying the south half and the other the north half of the building. These two supply mains reduce in size, as noted, to the far ends, which terminate in 1¼-in. valved connections to the returns adjacent to the boiler. It is possible by means of this arrangement to circulate hot water through the supply mains at all times, regardless of the number of radiators in service. It is also evident that this water will be at practicaly boiler temperature throughout the length of the supply mains.

It is possible for hot water gravity mains to grade either up or down from the boiler, the total rise or fall of the mains throughout their length being so small as to very slightly affect the circulation. The main object sought in grading the mains at all is to get rid of the air. In this particular case the supply started high at the boiler in order to give ample head room and to allow for the pipe work incident to twinning the two boilers. The high point is vented through an automatic float air valve. What air there is in the supply main must move against the flow of water or else be carried along with it. The amount of air accumulating in this main is almost negligible. It will be noted, in Fig. 5, that the air driven out of the water in the boilers passes into the expansion tanks over the boilers.

It will be observed that the return mains, two in number, start from near the point where the 6-in. supply branches into two 4-in. lines. Further, the returns start small, grade down toward the boiler, increasing in size as the supply decreases. Obviously, this arrangement requires that the supply main and the return main must be designed separately. Each return is 4-in. in size at the boiler.

It is evident from a glance at the sketch (Fig. 2) that air in the supply mains will move toward the high point if regular reducing fittings are used at the branch. In the case of the return main, however, it is necessary to use eccentric reducing couplings at points where the pipe size changes, in order to avoid air pockets.

HOW THE ARRANGEMENT BALANCES THE SYSTEM.

With the arrangement followed, a balanced system results and the first radiator to receive water, that is, the one nearest the boiler on the supply main, will be the furthest from the boiler on the return main. This radiator receives the hottest water and delivers it to the return main, as it should, at a somewhat lower temperature but still slightly higher in temperature than that delivered by the radiator next along the supply main. There is thus no conflict or "bucking" of water currents and the results are remarkably uniform. Every radiator is of even and nearly equal temperature and the circulation is rapid. As previously stated, the supply main is hot all the time, throughout its length, whether the radiators are off or on, so that there need be no unnecessary waiting for a radiator to heat up.

The diagrammatic sketch (Fig. 3) illustrates the arrangement, and the many advantages of this method of piping will be evident from a study of the circulation. It is observed that the supply main starts large and reduces to a minimum, while the return starts small and increases to a maximum in the direction of flow, quite a different arrangement from the plan usually followed. This sketch shows the far end of the supply tied into the return at some distance from the boiler.

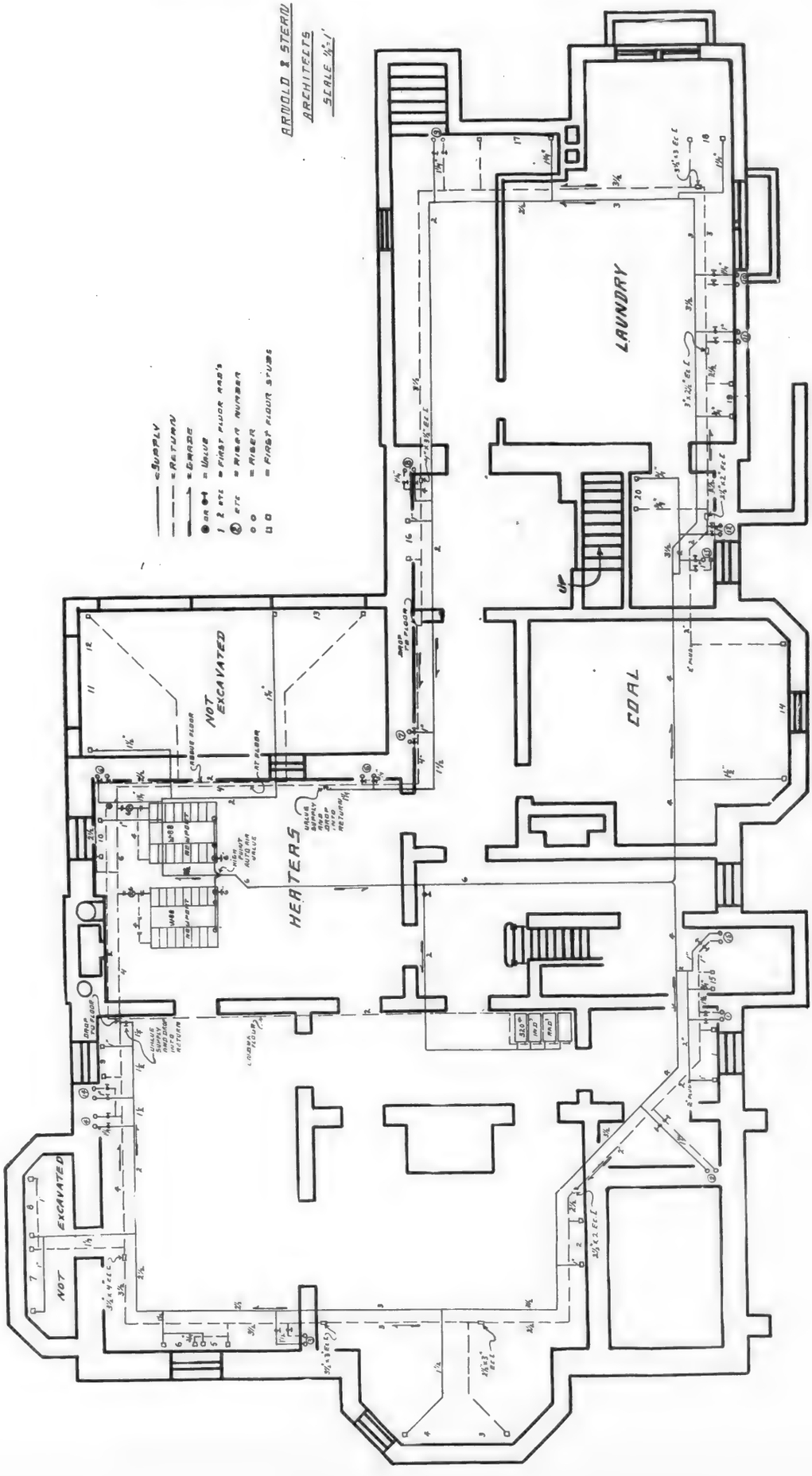


FIG. 1.—PIPING PLAN, SHOWING LAYOUT OF SUPPLY AND RETURN LINES.

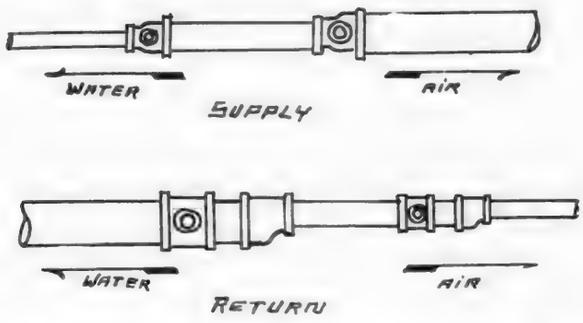


FIG. 2.—REGULAR REDUCING FITTINGS ON SUPPLY; ECCENTRIC REDUCING FITTINGS ON RETURN LINES.

exception to this is when the radiator has its tappings at the top and bottom, opposite or at some end. In this case the supply must always be at the top.

POSSIBLE TO OPERATE INSTALLATION AS A STEAM SYSTEM.

An examination of the piping layout, grades, etc., will make it apparent that this installation would work (perhaps, not perfectly) as a low-pressure two-pipe steam job. As a matter of fact, the plant was so operated during part of the past winter, while it was used to supply "temporary heat" while the building was being finished. This resulted in a great saving of time when radiators were added or changed. It is one thing to change a radiator in a steam job and quite another to change it in a hot water job of the size of the one in question.

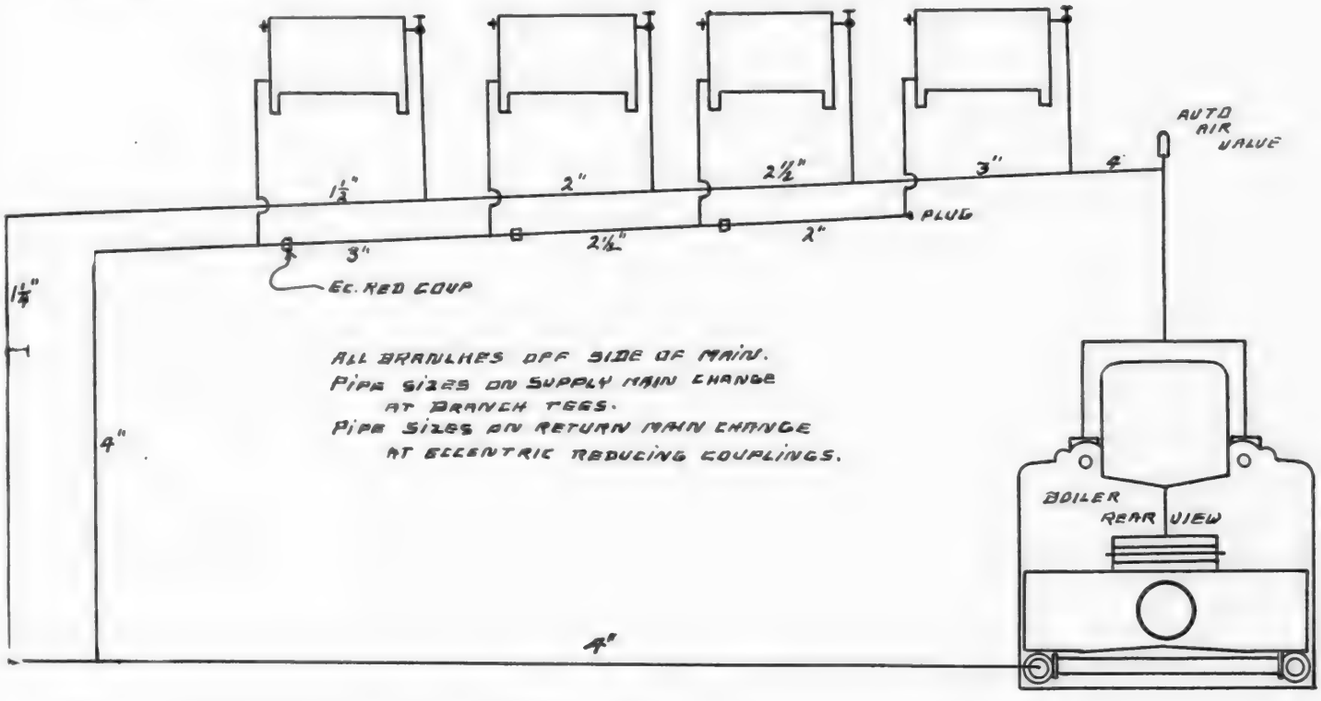


FIG. 3.—ELEVATION SHOWING GRADES ON SUPPLY AND RETURN MAINS AND PROGRESSIVE CHANGES IN PIPE SIZES.

As a matter of fact this "tie in" should be as close to the boiler as possible.

IMPROVED APPEARANCE OF PIPING SYSTEM.

With the arrangement of piping described, it is not necessary to "favor" a radiator or riser by taking the branch off the top of the main or at a 45° angle. In this installation every branch (supply and return) is taken off the side. With all branches uniform in this respect, a fine-looking piping layout results.

In some cases, on the first floor, where large radiators were required, these radiators were broken up into two, each with its individual connections and valve, but both radiators piped from one pair of branches. This allowed of flexible control and is a convenient arrangement.

Every pair of risers is valved near the mains and each riser has a small drain cock on the radiator side of the valve. It is possible by this means to shut off any set of risers without draining the entire system—a very important matter with a large system holding a considerable volume of water.

PLACING RADIATOR VALVES AT THE RIGHT.

It is good practice to always place the radiator valve at the right, for convenience in operation. This does not necessarily mean that the supply must be at the right. The supply may be at either the right or left as is most convenient for piping. An

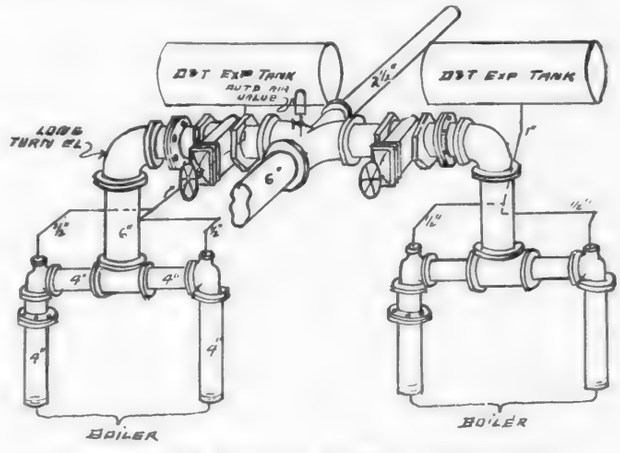


FIG. 4.—FRONT VIEW OF SUPPLY CONNECTIONS.

Even while operating the plant temporarily, as a water job, when a radiator was changed it was only necessary to draw the water down below the first floor radiators and it was not necessary to dump the fires. In this event, there is a rapid circulation through the supply main and back to the boilers, as explained early in the article. This provides a considerable load for the boilers (with mains uncovered) and prevents boiling.

Evidently, in this case, a comparatively small volume of water would have to be drawn from the system. It will be remembered that the risers are valved and this water need not be drawn down.

As a matter of possible interest in figuring the pipe sizes of the supply and return mains the data are given in the accompanying table for the mains on the south side of the house. It is evident that the area of the mains must be equal to the combined valve areas and this requirement has been met throughout.

DATA FOR FIGURING MAINS ON SOUTH SIDE OF HOUSE

Riser No. and Size in Diam.		Radiator No.	Sq. Ft.	Valve Size in. diam.	Area Sq. in.	Return Total Area Sq. in.	Return Pipe Size in. diam	Supply Total Area Sq. in.	Supply Pipe Size in. diam.
		14	200	1¼	1.50	1.50	2	14.60	
13	1	42	90	1	0.86	2.36		13.10	
12	1	41	26	¾	.53	2.89		12.24	
		40	41¼	¾	.53	3.42		11.71	
		20	32¼	¾	.53	3.95	2½	11.18	4
		19	18	¾	.53	4.48		10.65	
11	1	39	26	¾	.53	5.01	3	10.12	
		46	41¼	¾	.53	5.54		9.59	
10	1¼	38	75	1	.86	6.40		9.06	
		45	22	½	.30	6.70		8.20	3½
		18	80	1¼	1.50	8.20	3½	7.90	
		17	95	1¼	1.50	9.70		6.40	3
9	1¼	37	71¼	1	.86	10.56		4.90	
		44	57	¾	.53	11.09		4.04	2½
8	1¼	35	55	¾	.53	11.62	4	3.51	
		36	55	¾	.53	12.15		2.98	
		16	50	1	.86	13.01		2.45	
7	1	34	41¼	¾	.53	13.54		1.59	
		43	54	¾	.53	14.07		1.06	2
6	¾	33	36	¾	.53	14.60		.53	1½
									1¼

QUESTION OF VALVE AREAS

The question of valve areas requires careful consideration. If larger valves than necessary are used or required, correspondingly larger mains are necessary and the cost of the plant is unnecessarily increased. Good judgment should be used in this matter. The writer knows of a contractor whose practice on ordinary house work is to make all valve sizes on the first floor 1 in. and all on upper floors ¾ in. This practice is wrong; it should be evident that large radiators require more water and larger valves than small radiators. The nearness or remoteness of the radiator from the boiler, with the usual piping arrangement makes a very great difference in the size of the valve required. The length of the branch and the consequent effect on the circulation, due to friction, must be considered.

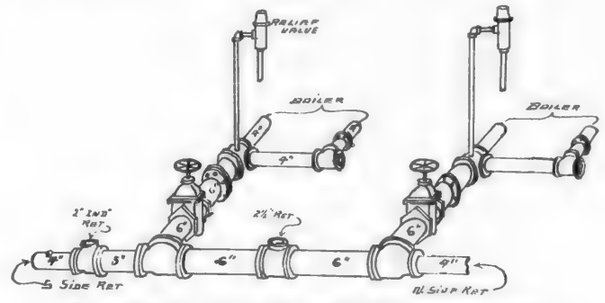


FIG. 5—REAR VIEW OF RETURN CONNECTIONS.

Further, the higher above the boiler the radiator is located, the more rapid the circulation and the smaller the valve required. In general, considerably smaller valve areas are used today than was the practice a few years ago. It is difficult to give any definite tabulated data on this point and all the factors mentioned above should be considered in designing the plant.

Fig. 4 shows the method of making the supply connections at the boiler. The idea kept in mind was the reduction of friction to a minimum. The maximum (main) pipe size is carried full to each boiler because at certain times of the year one boiler carries the entire load and must, therefore, handle the entire volume of water. The same points apply to the return connections, shown in Fig. 5.

HOW COCOANUT OIL IS HANDLED ON THE PACIFIC COAST

Details of the Special Heating Equipment Required to Liquefy the Oil So That It Can Be Pumped

BY CHARLES W. GEIGER.

WITHIN the past few years the development of the cocoanut oil trade between the Orient and the United States has increased to a trade of vast proportions. From a few straggling shipments in tins and barrels it has developed into huge bulk shipments which have required the installation of elaborate handling equipment.

In all plants handling cocoanut oil it is necessary to install special heating equipment, as cocoanut oil solidifies at a temperature under 70°, and cannot be handled in any other manner than by heating to restore same to a liquid. In all cocoanut oil-producing countries, the temperature is usually 100° or more and the oil in these countries is of about the same consistency as the heavier petroleum oils. It is of a consistency which enables it to be readily pumped into tanks aboard steamers.

TIN CANS, WOOD BARRELS AND STEEL DRUMS FORMERLY USED.

Formerly, such shipments of coacoanut oil as were exported to this country were contained in 5-gal. cans, also in wood barrels, and at times in steel drums. These methods soon proved objectionable as, on account of the high value of the product, extensive leakage in the case of tins and wood barrels caused heavy loss, the practice having been to use second-hand 5-gal. kerosene tins which, on account of rusting, would often develop extensive leaks. In the case of wood barrels the shrinkage caused these barrels to open up, with the result that very heavy losses were sustained by shippers.

The use of iron drums, while preferable to the other two containers, proved too expensive, as in most cases the drums were made in this country and shipped to the loading point, then back here; while the drums themselves were expensive. This, added to the freight both ways, made this practice very unprofitable.

HANDLING COCOANUT OIL IN BULK A RECENT DEVELOPMENT.

About five years ago, the project was conceived of handling this oil in bulk, and arrangements were made with various steamship lines operating between Oriental ports and the Pacific Coast ports to devote their deep tank space to the carrying of this product. At the same time preparations were undertaken at various Pacific Coast ports to provide storage tanks and other necessary facilities for receiving these bulk cargoes.

The deep tanks were all especially equipped with heating coils because as the steamers pass from the tropical waters into the temperate zone the low temperature of the sea water

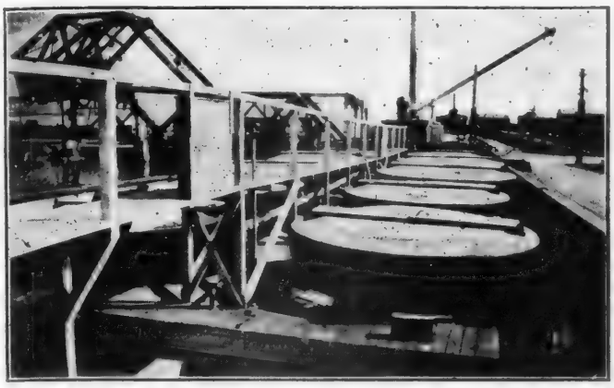


FIG. 1—TANK BARGE FOR COCOANUT OIL.

causes the cocoanut oil in the tanks to solidify, and by the time it reaches the Pacific Coast, especially in winter, the oil is very hard, and cannot be handled in any other manner than by heating to restore it to a liquid state.

To accomplish this heating, extensive steam coils or serpentines are placed in the bottom of the deep tanks of these vessels. This is absolutely necessary in order to liquefy the oil contained in the tanks of the vessel.

Some of the vessels regularly engaged in the trade are equipped with permanent pumps located in the engine room, with suction piping connected direct to the vessel's deep tanks, so that on arrival and after the oil is liquefied by heating, all that is necessary is to connect up the flexible hose between the ship and the pipe lines on the piers and to pump out the oil, much in the same manner as petroleum oils are handled in tank steamers. On certain vessels not equipped with pumps it is necessary to have at this end a complete portable pumping outfit.

Cocoanut oil is now being shipped from the Orient to Pacific Coast ports in tank steamers. These tankers carry petroleum products from the Pacific Coast ports to Oriental ports.

METHODS OF CLEANING CARGO TANKS.

The success of these tankers depends upon the system of cleaning out the cargo tanks in such a manner that the petroleum carried to the Orient will not contaminate the cocoanut oil carried on the return trip, and vice versa. After the petroleum has been discharged from the cargo tanks at the Oriental port, a head of steam is turned into the tanks for a period of from 12 to 24 hours. After the steaming process, the inside of the pump and tanks is washed down with a stream of hot water from a hose. When this process is completed and after the tanks have cooled sufficiently, members of the crew enter the tanks and scrape all hardened material from the sides and bottom. After the interior of all the cargo tanks has been cleaned thoroughly, the men wipe every nook and corner perfectly dry, and when this process has been completed the tanks are ready to receive the cocoanut oil, which is pumped aboard the tanker from barges.

From 200 to 1000 ft. of heating pipes are usually placed in each tank that carries the cocoanut oil. In almost every instance steam is turned into the heating coils before the vessel reaches the Pacific Coast port, so that the pumping operations may begin immediately after docking at the storage plant.

CONSTRUCTION OF STORAGE PLANTS.

The storage plants consist of substantially-constructed steel storage tanks and pumping equipment located on shore, usually within 2,000 ft. of the pier, into which the oil is discharged from the storage tanks of the steamer, through pipe lines. Such storage tanks have to be equipped with properly-placed heating coils; and all pipe lines handling oil have also to be provided with heating apparatus, for, in the event of a shut down in the pumping operations, the oil within a short time solidifies in the pipe line and it would not be possible to move it without the application of heat, regardless of the pressure applied.

The handling of this product in a hot state has required that pipe lines be so installed that expansion strains be properly taken care of and particular care has to be exercised in the fitting up of the heating coils to insure absolute tightness at all times, for the reason that the oil, when liquid, is of a very searching nature, and if it should find its way into the steam coils, would thoroughly plug same.

Practically all the oil received on the Pacific Coast is destined for eastern points and is transferred from storage stations to

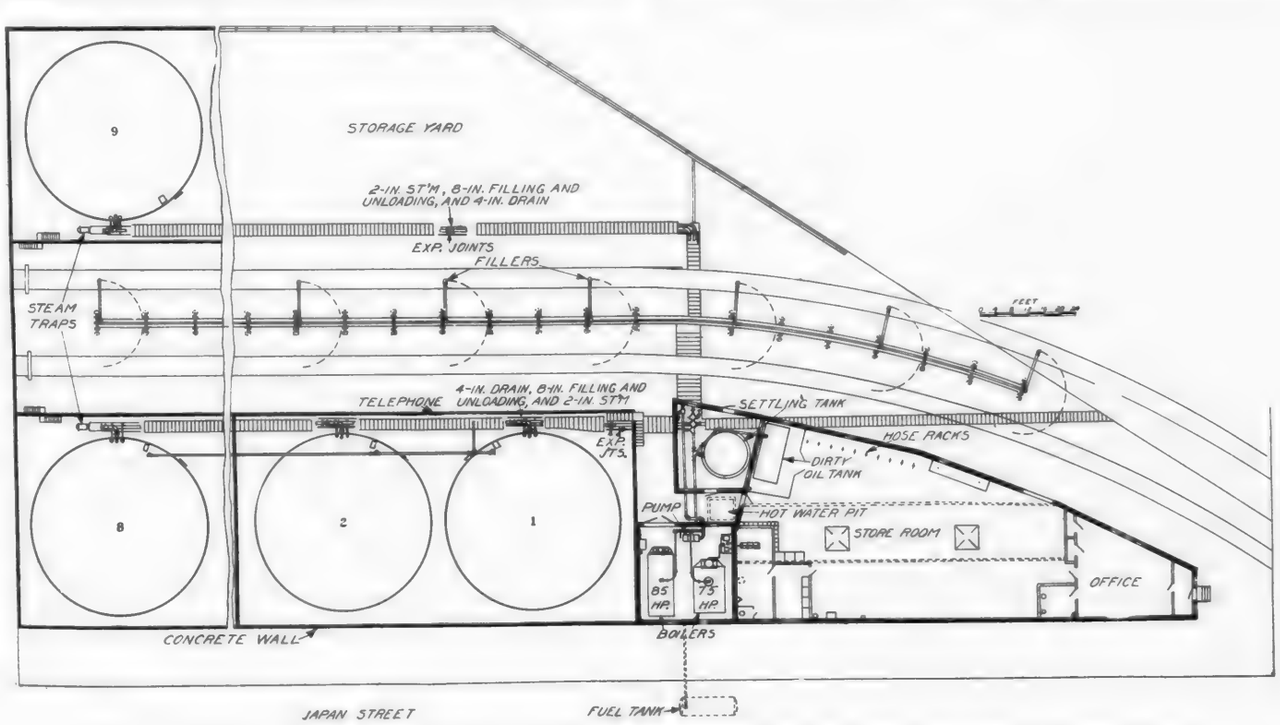


FIG. 2—TYPICAL LAYOUT OF PLANT FOR TRANSFERING COCOANUT OIL FROM STORAGE TO TANK CARS.

its ultimate destination in large steel tank cars of from 8,000 to 10,000 gal. capacity each.

The oil in the storage tanks is made liquid by heating, and then pumped into these tank cars, the entire operation being along the same lines as for handling petroleum oils, except that on account of the oil becoming a solid at a temperature of 70° F., the tank cars are fitted with steam-heating pipes so that on arrival at the destination heat can be applied to liquefy the contents of the car and thus permit their removal.

At the cocoanut oil storage plant of the W. R. Grace Company, in San Francisco, there are three 6-in. pipe lines leading from the storage tanks to the piers where the vessels carrying the oil tie up for unloading. At the end of each pipe line, there is a manifold, which is connected to the discharge pipes of the steamer's cargo tanks by means of flexible hose. All pipe lines leading from the piers to the steel storage tanks on shore and all pipe lines leading from the storage tanks which are used in filling the tank cars, have a 1-in. steam pipe extending their entire length, held in the center of the

FIG. 3—A-FRAME SUPPORT FOR OUT-DOOR STEAM LINES USED FOR MELTING COCOANUT OIL.

6-in. pipe by hangers. The steam pipe extends to the end of the 6-in. pipe and returns on the outside of the pipe line to a pump in the boiler room.

Two pumps are used to pump the oil from the storage tanks to the tank cars. One of these pumps is electrically-operated and the other is steam-driven. The steam-driven pump is equipped with a steam jacket to melt the oil which accumulates in same and which becomes hardened after pumping ceases. The electrically-driven pump is equipped with numerous drain cocks. Immediately after the electric pump is closed down, all the cocoanut oil is drained by means of these drain cocks.

PIPING EQUIPMENT OF TANK CARS.

For the purpose of bringing the oil in the storage tanks to a liquid state for pumping into tank cars, each tank is equipped with 2,000 ft. of 2-in. steam coils. These steam coils are connected to the boiler by means of pipes laid in a tunnel. These coils, together with the steam pipes extending through the 6-in. filling pipes, all return to a sump located in the boiler room. The boiler-room attendant at intervals examines the water returning from these coils and steam pipes for traces of oil. If any is noticed it is an indication that there is a leak in the line, and as it is not desirable for water to become mixed with the cocoanut oil, the leak is sought and repaired at once.

Steam for heating pipes and for operating the steam-jacketed pump is generated by a 100-H. P. Scotch Marine boiler, burning oil.

The oil pumps employed in loading the tank cars are capable of pumping 20,000 gal. of cocoanut oil an hour. The plant is capable of loading approximately 12 tank cars at a time. Precautions are taken to see that the tank cars are perfectly clean and dry before any oil is loaded into them. It requires from

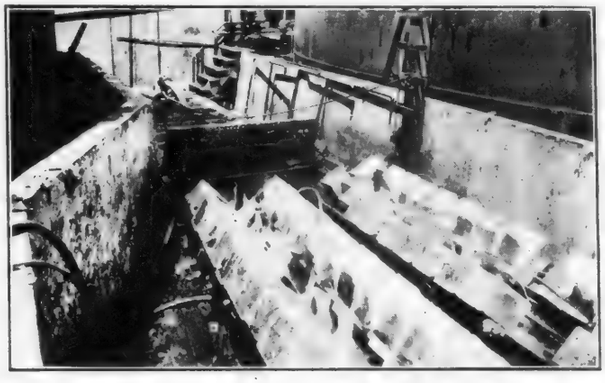


FIG. 4—DUMPING TABLE AT A SEATTLE PLANT, SHOWING CAKES OF SOLID COCOANUT OIL.

one to six hours to clean a tank car so that it is in proper condition to receive oil. This is done by turning live steam into the tank, after which the interior is washed down with a stream of hot water. The water is allowed to escape from the tank through the discharge pipe. After the interior of the tank is thoroughly washed, it is wiped dry.

HANDLING OIL RECEIVED IN TIN CANS.

A certain amount of cocoanut oil is received at the Pacific Coast ports in 5-gal. tin cans. Before this oil can be transshipped it has to be melted and emptied from the cans, and pumped into tank cars or storage tanks.

At the plant of the W. R. Grace Company sets of steam pipes have been so arranged that the 5-gal. cans rest directly on the pipes. Before being placed on the steam pipes, the end of each can is cut open, and the can placed on the pipes with the open end turned down. The cans are moved down the steam pipes slowly. The solid oil soon becomes liquid and

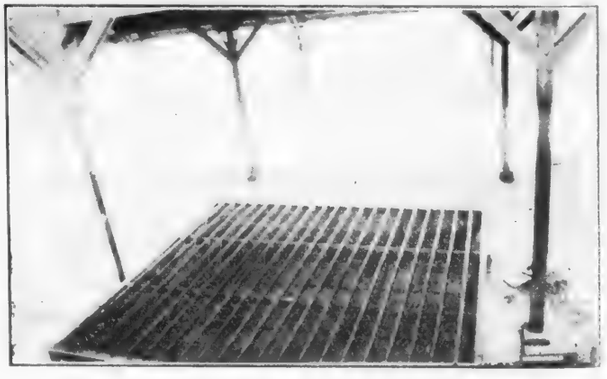


FIG. 5—VIEW OF PORTABLE DUMPING TABLE.

runs into troughs placed under the steam pipes. These troughs empty into an underground concrete sump. By the time the cans have reached the far end of the steam pipes, the contents of the cans have become nearly liquid. At this point a workman picks up the cans, and drops the remaining oil into the concrete sump, which is equipped with a number of steam pipes in the bottom. The heat from these pipes soon reduces the entire mass of oil to a liquid, which is then pumped in to tank cars or into storage tanks.

In the accompanying illustrations Fig. 4 shows a dumping table at a plant in Seattle. In Fig. 5 is shown a portable dumping table. This table may be moved to a pile of case oil, which is a very valuable feature.

At some of the plants the cans of cocoanut oil are brought to a liquid before being opened. The cans are then run through a machine equipped with a series of knives, which cut both ends out simultaneously, and instantly the entire contents of the can runs into a sump from which it is pumped into tank cars or storage tanks.

STATE PLANT IN OPERATION FOR HANDLING COCOANUT OIL.

Profiting from the experiences of the various plants on San Francisco Bay, the engineers of the California State Harbor Board have designed a plant for handling cocoanut oil that is claimed to embody all the desirable features of the previously-constructed plants.

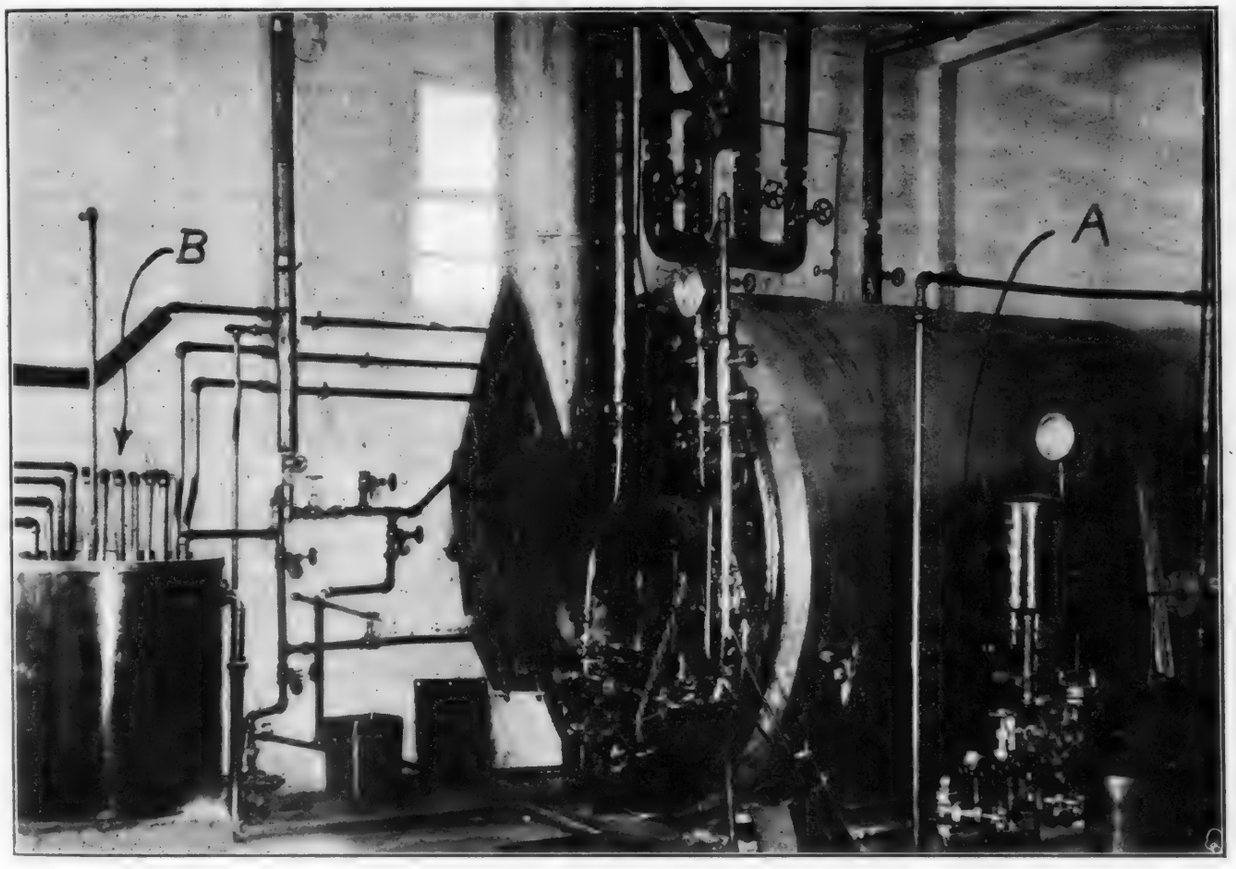


FIG. 6—OIL-BURNING BOILER IN COCOANUT OIL PUMPING PLANT OF W. R. GRACE COMPANY, SAN FRANCISCO.

Heating boilers and steam pipes are installed for handling the oil in movement and for cleaning. There is also a pumping plant, pipe lines, case and barrel storage.

The Harbor Board has provided a few storage tanks, most of the storage tanks having been built by private concerns who hold leases at the terminal. The heating plant and pumping equipment is open to the use of the lease holders at the terminal, but the Harbor Board maintains the policy of making adequate provision for the public handling of importations. Anyone importing oil in cases will have a place in which at regular port fees charged for handling such products, they may store their goods, or have the oil emptied from the cans and pumped into storage tanks or tank cars.

In conjunction with the oil station there has been provided a tank barge which is used as the connecting link between the steamships and the storage tanks and which is available in case any cargoes of bulk oil are not large enough to justify the steamship's moving to the oil berth. This barge ties up at the steamer and the oil pumped from the steamer's tanks in to tanks on the barge, thus making it unnecessary for the steamer to move to the oil dock.

This barge is equipped with ten tanks which have been equipped with steam coils for heating the cocoanut oil. Steam for these coils is supplied by an upright donkey boiler, burning fuel oil.

Taxation of New Building Dependent on Time of Installation of Heating Facilities.

In a proceeding to review an assessment for taxation upon real property in the city of New York under the Greater New York Charter, section 1889a providing that "a building in the course of construction, commenced since the preceding first day of October and not ready for occupancy, shall not be assessed," it appeared that all the apartments in the building were rented while it was still in course of construction, and before October, 1917, some of the tenants had moved their furniture into their respective apartments. No heating facilities had been furnished by that time, however, and of the 600 steam heating radiators required to heat the apartments, only twelve had been installed. It took 120 days' work to construct the heating apparatus after the 1st of October, in which month the temperature averaged 54°, whereas the court said, 70° is requisite for comfortable living. This being a new building, more heat might be essential in the fall of the year than in an old one. The New York Court of Appeals holds, People v. Cantor, 130 N. E., 305, that the building was not complete on the 1st day of October, and was not assessable for taxation, especially where the certificate of occupancy was not issued until October 10th, in view of Section 121 of the Tenement House Law. The court did not consider it reasonable to consider an apartment, irrespective of its class or elegance, fit for occupancy, which has no heat during the fall months, and also is lacking in proper lighting facilities.

SIDE LIGHTS ON FANS AND THEIR FUNCTIONS

BY DAVID DARRIN

AIR is like a bad kid who knows it and is glad. Most of the time it roams where it lists and all of the time it opposes efforts to make it roam according to any other plan. However, there are some laws that even this vagrant respects and some methods of handling by which it can be induced to work effectively. Most vagrants are that way.

On the other hand, air is an orderly and useful servant of man, observing strictly and continuously all the rules and regulations of Nature governing its special functions. But when it is crudely handled by people who do not realize that, unlike solid and liquid substances, air is free to move in three dimensions and in both directions of each, and that it is capable of expansion to the point of practical vacuum and compression to the point of liquefaction, then it twists and squirms and balks worse than any mule ever could. Most useful servants are that way.

AIR MOVING METHODS

The principal function of a fan is to move air. This it does by rotation and the distinguishing feature of the process is that by this means large volumes of air are delivered. There are other devices for moving air. The air compressor accomplishes this movement by reciprocating action and delivers air at high pressures. The ordinary furnace-chimney combination is another form of air motor which accomplishes its purpose by thermal means and delivers air at high temperatures. Most furnace-chimney combinations are far more efficient as air motors than they are as heat sources. But we are interested at present in fans only.

AIRPLANE CONTRIBUTIONS

It has been mentioned that fans rotate. When they do this in air, the air rotates also. When air rotates it immediately tries to get away from the axis of rotation. This is one of the laws of its being—almost an instinct. It can be counted upon to do this invariably. There are two other of its instincts which are worthy of special attention. First of these is its abhorrence of a vacuum. In fact, it is generally by air leakage that the similar and well-known attitude of Nature is expressed. The whole difficulty of eddy currents springs from this single air trait. Second of these air characteristics is its desire for direct, straight-line motion. It does not like any kind of a bend in its path and a sharp bend it simply detests.

With the advent of the airplane—and just about one hop ahead of its development during the war period—we learned a lot of new things about this old servant. For instance, we learned that the air pressure on the under side of a moving wing has very little to do, and the air suction on its upper side very much to do, with the lifting force applied by the air to the wing. Part of this same discovery was the additional fact that by playing on its abhorrence of a vacuum, air can be led instead of forced to alter its direction of travel. And we learned too, that as far as air action is concerned, the propeller of an airplane is simply a moving wing—in this it resembles a bird's propeller.

This completes the circuit of a single-track mind and brings us back to the subject of fans in which our interest is exclusively centered. As in the airplane, the moving feature in a fan is the propeller and all fans have them, although the similarity to an airplane propeller is more marked in some fans than in others. Let us look at a few fans.

FAN EVOLUTION

In the beginning was the disc fan. It drew in air from one direction and discharged air in several directions, as shown in Fig. 1. This type of fan proved unsuitable for some purposes, so a band was wrapped around the fan, contacting at the blade tips, or else the fan was run in a housing that almost touched these tips and achieved the same result, namely; prevention of discharge perpendicular to the axis of rotation. Remember that the rotating air will start right away from this axis if it can. Fig. 2 shows the result of this step in graphic form. At this point the growth of fan design split into two branches. Some designers wanted even more curbing of the outward flow tendency and this was secured by shaping the blades of the disc fan so as to deflect the air from a radial to an axial course. The outcome of this development was the propeller type fan, shown in Fig. 3, a device with which to deliver air in a direction approximately the same as the direction of flow at intake. Other designers, noting that the hub of a propeller fan delivers no air and that the portion of the blades close to the hub, gives very little discharge, and observing also that the rotating air seemed most anxious to travel perpendicular rather than parallel to the axis of rotation, decided to humor the air in a measure. They could not get rid of the hub but the ineffective portions of the blades were eliminated and the blade tips were bent back toward the intake so that their delivery edges approached and finally achieved a position parallel to the axis of rotation. The centrifugal fan produced by this development, delivers air in the direction that the air wishes to travel and consequently the efficiency of delivery is higher. This does not mean that fans of this type are more suitable for all purposes. In Fig. 4 is shown a brief graphical history of this phase of fan development.

CENTRIFUGAL IMPELLERS

We have seen how the growth of the disc fan into the propeller type was effected by changing the blade shape and pitch. The centrifugal type fan has experienced a similar growth from the paddle-wheel fan, with a few radial vanes, to the type which has a large number of curved blades set around its periphery. There are three possible pitches for the blades in fans of this

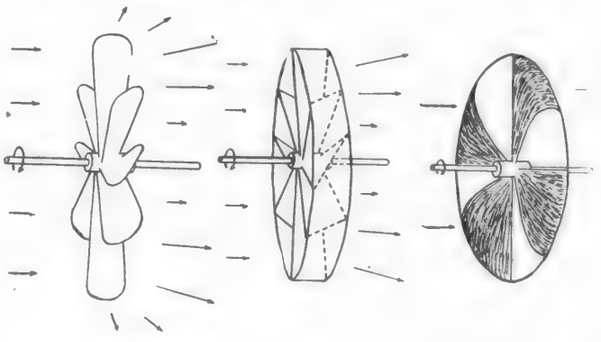


FIG. 1 DISC FAN. FIG. 2 DISC FAN. FIG. 3 PROPELLER FAN

type, that is, radial, pitched forward with rotation, and pitched backward against rotation. The five possible blade shapes are; plane, curved down (toward incoming air), curved up (toward outgoing air), and double curved—of which there are two possibilities, first down then up, and first up then down. In Fig. 5 are shown the possible combinations of these three-blade pitches and five-blade shapes. Not all of these combinations are practical; fewer still are in standard use to-day.

Air passing through a fan of this type in rotation has a tendency to do three things; first, to travel perpendicularly away from the axis of rotation; second, to travel away from the blade with a direction component normal to the front surface of the same; and third, to travel along the blade from the entering to the trailing edge and to leave the blade tangent to the trailing edge.

Let us see how the combinations of blade shape and pitch, shown in Fig. 5, utilize or oppose these tendencies of the air. It is not necessary to consider each combination separately, since the general principles of the subject can be covered by reference to a few special cases. All of the radial settings tend to produce heavy eddy currents behind the advancing blade. Combination A is the only one which offers neither opposition nor assistance to the centrifugal tendency of air motion. All of the forward pitched blades tend to oppose this component. This can be easily seen by considering the relations between air motion and blade travel.

Here it should be explained that for all the combinations shown in Fig. 5, air motion is assumed to be vertically up or

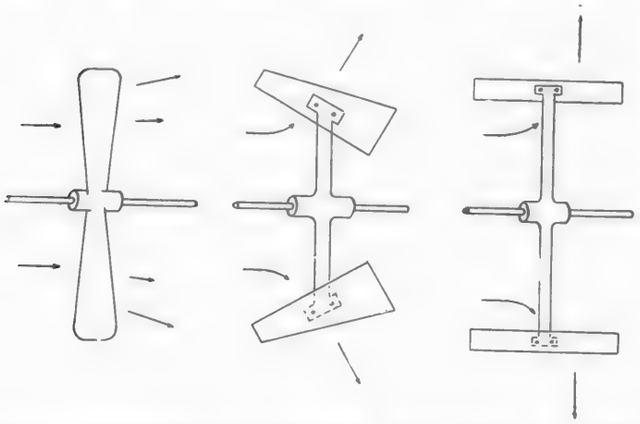


FIG. 4—EVOLUTION OF DISC FAN INTO CONE FAN INTO CENTRIFUGAL FAN.

from south to north on the page, while the direction of blade travel is similarly assumed to be horizontal from right to left or from east to west on the page. Of course the blades actually rotate, but it is easy to see that for an instant this amounts to the same thing as translation and that, eliminating the centrifugal tendency, the forward pitched blades would naturally tend to force air downward or north to south, opposite to the direction it actually takes. For the same reason it is apparent that the backward pitched blades tend to assist the centrifugal motion of the air.

In another way too, the forward pitched blades tend to oppose and the backward pitched blades to assist the air in its actual motion. The blades with forward pitch present trailing edges to the incoming air with a tendency to slap it back from the blade. Combination E which is the one that is most generally used in present-day fans, is the least guilty in this respect, while combination H is so bad that it would probably give very low efficiency. Backward-pitched blades present entering edges to the incoming air stream and tend to scoop in the air. Of the combinations with backward pitch, that shown at I has the strongest tendency and that shown at F the weakest tendency to such action.

The subject of blade shape and pitch design can be summarized in this way. The blade with up curve and forward pitch (combination E) delivers large volumes of air at comparatively low fan speeds—that is, the velocity of air delivery is greater than the peripheral speed of the fan. This design is not intended to give high air pressure at delivery or large pressure drop at intake. The delivery of large volumes at low pressures is what is required in heating and ventilating work, which accounts for the preponderance of combination E in fans designed for such service. The blade with up curve and backward pitch (combination F) delivers small—relatively—volumes of air at low speed—meaning that the velocity of air delivery is less than the peripheral speed of the fan. With this design comparatively high delivery pressure, or comparatively large pressure drop at intake can be secured. This is what is required for forced or induced draft for furnaces and for the movement of air containing solid matter, such as dust, grit, shavings, fibres, and similar small or light particles. However, the latter duty has an additional requirement that the blades be few in number, of simple and extra durable construction, with large spaces between them. So while combination F is suitable for forced-draft purposes, the heavier duty exhaust work is usually handled by a plane blade radially set, as represented in combination A. The characteristics of this combination are medium between those of the other two described, and in addition it permits the simplicity and durability of construction essential to the heavier duty.

FAN HOUSINGS

When the air stream has left the delivery edge of the blade, we lose interest temporarily in the impeller and begin to notice the housing. This air has left the impeller in all directions of a circle—like the discharge from a pyrotechnic pin-wheel—but it is wanted in only one direction. Consequently the cross-section of the housing, perpendicular to the fan shaft, assumes a spiral form and it would be hard to imagine a better form with which to accomplish this result. The sides of the housing vary in form according to several factors. If the impeller wheel is to be overhung, there is a bearing required on one side only and the intake on the opposite side can be unobstructed. If the

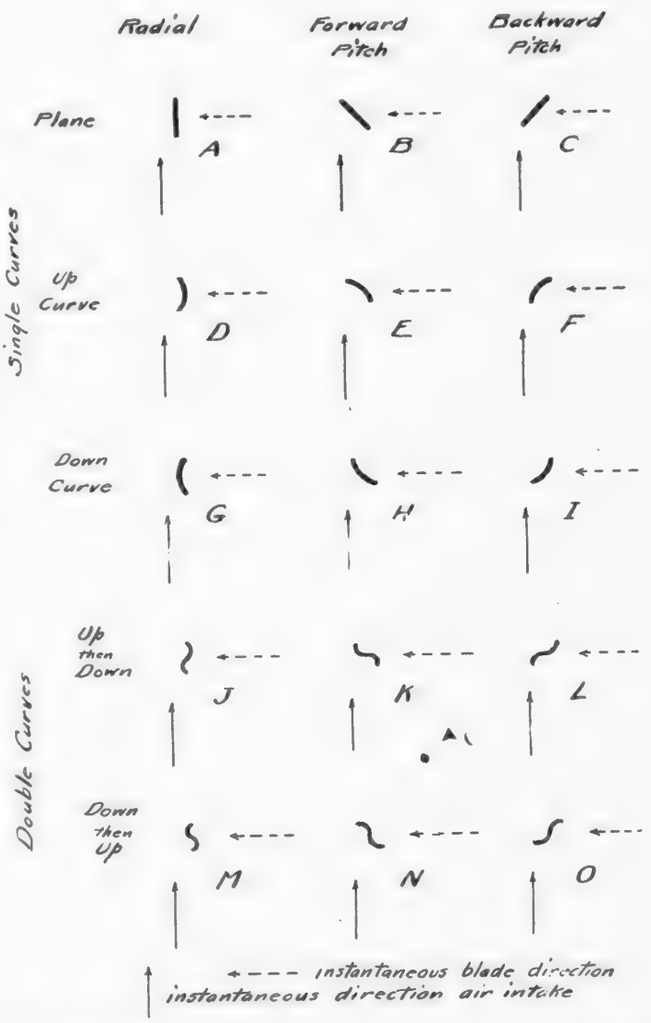


FIG. 5—CHART OF POSSIBLE COMBINATIONS OF BLADE SHAPE AND PITCH IN CENTRIFUGAL FANS.

pulley or coupling is to be overhung, there must be a bearing on both sides of the housing and the intake area will be reduced by this bearing and its supporting structure. If there are two intakes, one of them will be so obstructed anyhow. Housing variations in the matters of discharge angle and hand of the

fan are dictated rather by operating requirements than by questions of air action.

PROPELLER FANS

With the propeller type of fan the problem suggests that of a ship propeller with the differences that the successful fan impeller remains axially stationary while the ship impeller that remained axially stationary during operation would be considered a failure. The relatively small density of air, as compared to water, allows of a larger number of blades in a fan than would be considered practical for a ship propeller and for the same reason the speed of the fan can—in fact, must—be greater than that of the ship propeller. These things mean that the fan impeller must be designed to resist radial or centrifugal stresses primarily, since the axial stress or thrust, which is an important item in the design of a ship propeller, is of small importance in a fan, aside from its relation to the proper operation of the drive motor.

There is sometimes difference of opinion as to whether the propeller type or the centrifugal type of fan is the better fan to use. As a matter of fact, each has a particular environment in which it functions to best advantage.

HOW HEATING AND VENTILATION IS TAUGHT AT PURDUE UNIVERSITY

BY R. W. NOLAND, M. E.
Professor of Heating and Ventilation

IV.

—PIPE CAPACITIES I—

STANDARD ONE PIPE STEAM — PIPE SIZES CAPACITIES IN SQ. FT. OF RADIATION.

J.A. DONNELLY.

PIPE SIZES	STEAM MAIN AND DOWN FEED RISERS	UP FEED RISERS	RADIATOR CONNECTIONS	WET DRIP	DRY DRIP
1	40	40	24	1600	75
1¼	75	75	60	3000	150
1½	150	125	100	6000	300
2	300	280	200	12000	500
2½	500	460		20000	1500
3	900	670		36000	2800
3½	1500	900		60000	6000
4	2000	1200		80000	13000
4½	2800	1500			18000
5	3600	1860			23000
6	6000	2700			37000
7	9000				55000
8	13000				78000
9	18000				
10	23000				
12	37000				
14	55000				
16	78000				

CALCULATED FOR A PRESSURE DROP OF 1-OZ PER 100 FT

UP FEED RISERS AND RADIATOR CONNECTIONS SIZED TO ALLOW FLOW OF CONDENSATION IN OPPOSITION TO STEAM, I.E. 30' PER SECOND IN RISERS, AND 15' PER SECOND IN RADIATOR CONNECTIONS.

STEAM RISER (IN.)	DRIPS TO WET RETURN (IN.)	DRIPS TO DRY RETURN (IN.)
1	¾	¾
1¼	¾	¾
1½	¾	1
2	1	1
2½	1	1¼
3	1	1¼
3½	1¼	1½
4	1¼	1½
4½	1¼	2
5	1½	2
6	1½	2½

—PIPE CAPACITIES II—

STANDARD STEAM AND RETURN PIPE SIZES FOR TWO PIPE GRAVITY SYSTEMS - CAPACITIES IN SQ FT. OF RADIATION

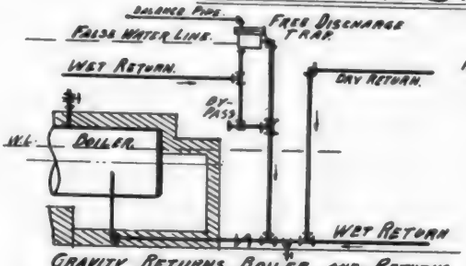
J. A. DONNELLY.

PIPE SIZE (IN)	STEAM MAIN	WET RETURN	DRY RETURN	RISERS TO WET RETURN	RISERS TO DRY RETURN	RAD CONN.
¾	20	800		150	40	40
1	40	1600	75	300	75	75
1¼	75	3000	150	500	150	150
1½	150	6000	300	900	300	300
2	300	12000	500	2000	500	
2½	500	20000	1500	3600	1500	
3	900	36000	2800	6000	2800	
3½	1500	60000	6000		6000	
4	2000	80000	13000			
4½	2800		18000			
5	3600		23000			
6	6000		37000			
7	9000		55000			
8	13000		78000			
9	18000					
10	23000					
12	37000					
14	55000					
16	78000					

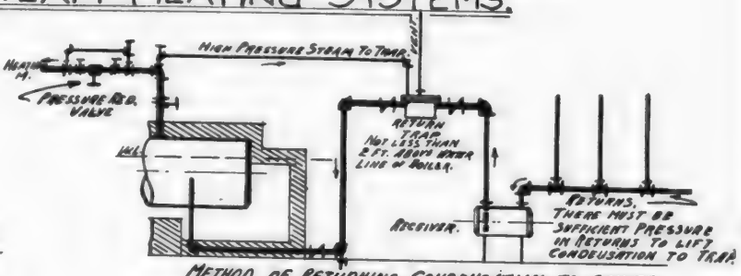
STEAM RISER (IN.)	DRIPS TO WET RETURN (IN.)	DRIPS TO DRY RETURN (IN.)
1	¾	¾
1¼	¾	¾
1½	¾	1
2	1	1
2½	1	1¼
3	1	1¼
3½	1¼	1½
4	1¼	1½
4½	1¼	2
5	1½	2
6	1½	2½

CHARTS OF PIPE CAPACITIES USED IN TEACHING HEATING DESIGN AT PURDUE UNIVERSITY.

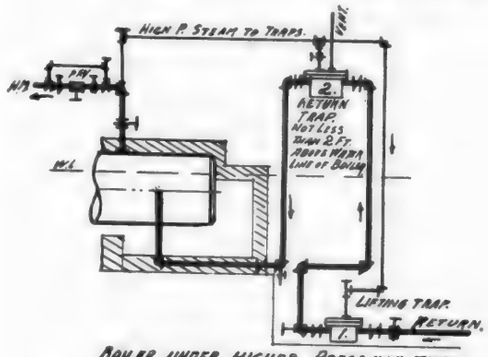
TYPICAL METHODS OF RETURNING CONDENSATION TO BOILERS IN STEAM HEATING SYSTEMS.



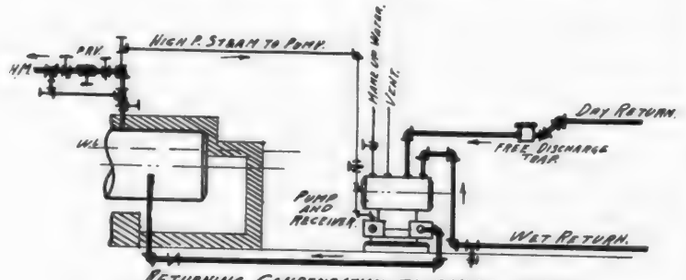
GRAVITY RETURNS. BOILER AND RETURNS UNDER PRACTICALLY THE SAME PRESSURE.


HIGH PRESSURE STEAM TO TRAP
VENT
H.P.
PRESSURE REG. VALVE
W.L.
RETURN TRAP NOT LESS THAN 2 FT. ABOVE WATER LINE OF BOILER.
RECEIVER.
RETURNS. THERE MUST BE SUFFICIENT PRESSURE IN RETURNS TO LIFT CONDENSATION TO TRAP.

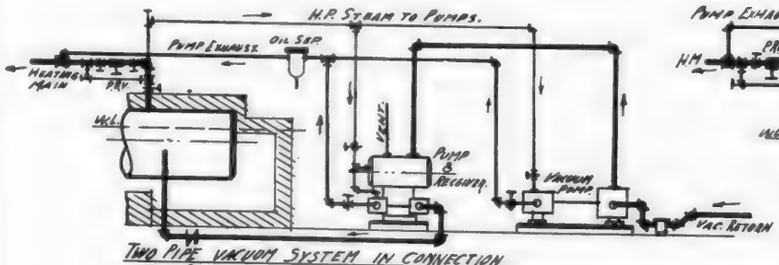
METHOD OF RETURNING CONDENSATION TO BOILER BY USE OF RETURN TRAP. WHERE BOILER IS UNDER HIGHER PRESSURE THAN HEATING SYSTEM.



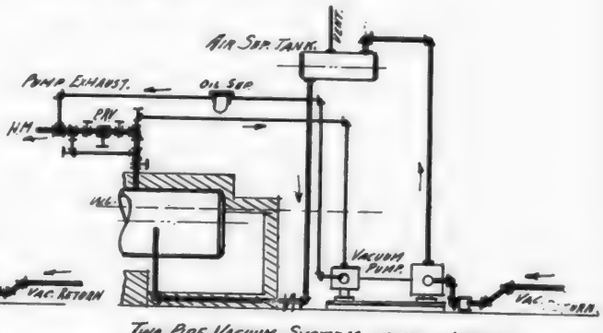
BOILER UNDER HIGHER PRESSURE THAN HEATING SYSTEM. #1 LIFTS CONDENSATION TO #2 WHICH DISCHARGES IT INTO THE BOILER.



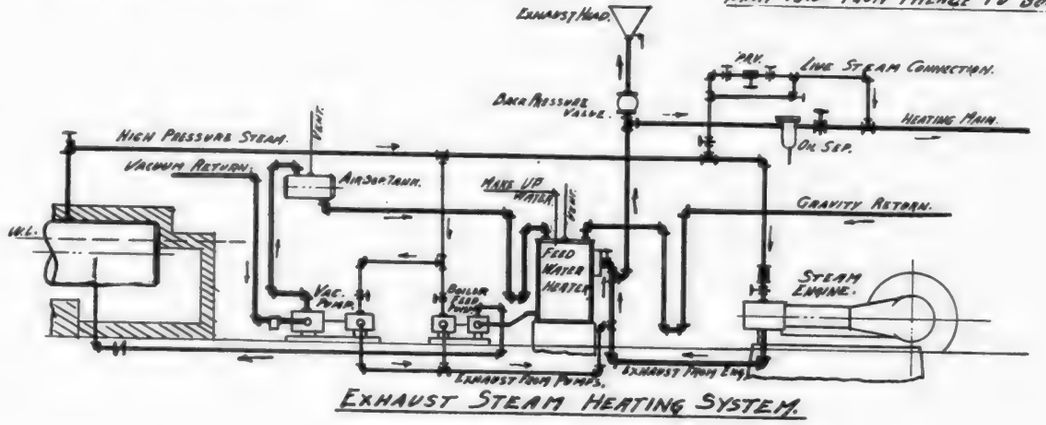
RETURNING CONDENSATION TO BOILER UNDER HIGHER PRESSURE BY MEANS OF PUMP AND RECEIVER.



TWO PIPE VACUUM SYSTEM IN CONNECTION WITH PUMP AND RECEIVER.



TWO PIPE VACUUM SYSTEM WITH VACUUM PUMP DISCHARGING INTO AIR SEPARATING TANK AND FROM THENCE TO BOILER.



EXHAUST STEAM HEATING SYSTEM.

— PIPE CAPACITIES III —

CAPACITIES OF STEAM AND RETURN MAINS FOR AIR RETURN GRAVITY SYSTEMS - CAPACITIES IN SQ. FT. OF RADIATION.

J. A. DONNELLY.

PIPE SIZE	STEAM RATING	WET RETURN	MAIN RETURN	DRY RETURN		
				RETURN RISER	RADIATOR CONNECTIONS	DRIP
½					50	
¾	20	800		200	100	
1	40	1600	500	400	200	
1¼	75	3000	1000	800	400	¾
1½	150	6000	2000	1500		¾
2	300	12000	4000	3000		¾
2½	500	20000	7000	5000		1
3	900	36000	12000			1
3½	1500	60000	20000			1
4	2000	80000	27000			1¼
4½	2800		37000			1¼
5	3600		48000			1¼
6	6000		80000			1¼
7	9000					
8	13000					
9	18000					
10	23000					
12	37000					
14	53000					
16	78000					

CAPACITIES OF STEAM AND RETURN MAINS FOR VACUUM SYSTEMS.

PIPE SIZES	STEAM RATING	MAIN RETURN	RETURN RISERS	RADIATOR CONNECTION	DRIP
½				100	
¾	20	600	400	200	
1	40	1200	600	400	
1¼	75	2400	1200	600	
1½	150	4800	2400		¾
2	300	9000	4800		¾
2½	500	15000			¾
3	900	23000			1
3½	1500	37000			1
4	2000	55000			1
4½	2800	78000			1¼
5	3600				1¼
6	6000				1¼
7	9000				
8	13000				
9	18000				
10	23000				
12	37000				
14	53000				
16	78000				

—PIPE CAPACITIES IV—

CAPACITIES OF STEAM DISTRIBUTING MAINS WITH TOTAL FRICTION OF 1 LB FOR THE LENGTH OF RUN, RADIATION IN SQ. FT. UNWIN FORMULA.

J. A. DONNELLY.

PIPE SIZE	LENGTH OF RUN IN FEET.							
	300	400	600	800	1000	1200	1500	2000
4	3300	2800	2300	2000	1800	1600	1450	1250
4½	4600	3950	3200	2800	2500	2300	2050	1750
5	5900	5100	4100	3600	3200	2950	2600	2250
6	9800	8500	7000	6000	5500	4900	4400	3800
7	14700	12800	10500	9000	8250	7350	6600	5700
8	21000	18400	15000	13000	11900	10600	9500	8200
9	29400	25600	21000	18000	16500	14700	13200	11400
10	37600	32600	27000	23000	21100	18800	16900	14600
12	60400	52500	43000	37000	34000	30200	27100	23400
14	89800	78000	64000	55000	50400	45000	40300	34800
16	127400	110000	91000	78000	71500	63700	57200	49400

CACULATIONS MADE ON THE ASSUMPTION THAT FITTINGS, ENTRAINED WATER ETC., DOUBLE THE FRICTION OF STRAIGHT PIPE.

MAXIMUM CONDENSATION OF RADIATING SURFACE AND CONNECTED PIPES TAKEN AS 0.3-LB. PER SQ. FT. PER HR.

SIZES OF HIGH AND LOW PRESSURE MAINS AND REDUCING VALVES FOR 1-LB. PER 100 FT. DROP ON HIGH PRESSURE AND 1-OZ. PER 100 FT. ON LOW PRESSURE MAIN.

HIGH PRESSURE MAIN (IN.)	REDUCING VALVE (IN.)	LOW PRESSURE MAIN (IN.)	CAPACITY IN DIRECT RADIATION (SQ. FT.)
1½	1½ x 3	3	900
2	2 x 4	4	2000
2½	2½ x 5	5	3600
3	3 x 6	6	6000
3½	3½ x 7	7	9000
4	4 x 8	8	13000
4½	4½ x 9	9	18000
5	5 x 10	10	23000
6	6 x 12	12	37000
7	7 x 14	14	55000
8	8 x 16	16	78000

BOILER PRESSURE 30-LB. OR OVER

PIPE CAPACITY CHARTS USED IN PURDUE HEATING COURSE

INSTRUCTION COURSE FOR CUSTODIANS AND JANITORS

Lesson No. 7—Maintaining Comfort in School Rooms

BY EDWIN S. HALLETT,

Chief Engineer, St. Louis Board of Education.

THE most important accomplishment to be desired in a school room is to keep the attention of the teacher from matters of heating and ventilation. The effective teaching is frequently lost in diverting the attention of the school to heating apparatus. The old red hot common stove produced great discomfort but never played upon the imagination to divert the mind from school work as is often the case with the modern heating plant.

The agitation of distrust must be prevented by the proper handling of the plant and by informing the teachers on the question of ventilation. There is now no way of doing this but through the custodian of the building. The intelligence and tact coupled with a thorough knowledge of the manipulation and adjustment of the plant has saved the day for ventilation on many occasions. The proper explanations of the teacher must be coupled with the proper performance of the plant. Deception on the part of the custodian is never justified although he might occasionally get away with it. It is not necessary even when the teacher is laboring under a delusion. The better way is to get together as to purpose and demonstrate the fine effects of a perfectly ventilated school, when the teacher has the time and inclination to study it. The personal equation has 90% of weight in all such matters and it should be recognized by the custodians and engineers.

IMPORTANCE OF LOOKING AFTER THERMOSTATS.

To produce a delightful air condition in a school requires heat and moisture control that is 100% reliable. If the thermostats are in the habit of going bad it would be wise to spend enough money to put them in good condition. Do not let teachers and pupils tamper with them. Do not adjust them without taking ample time to see that they are performing in a reliable manner. Where no fan is used some means of evaporating water should be provided. Humidity is very es-

sential to comfort and the temperature of comfort will depend upon the humidity. If no moisture is introduced the temperature of comfort will be above 70°, and even this high temperature with low humidity is not satisfactory. The best results are obtained with a temperature of 68° and about 50% relative humidity. The lower temperatures are certainly conducive to health. Increase the humidity and decrease the temperature.

It sometimes occurs with old fan systems that a strong wind storm in cold weather makes it difficult to heat the rooms on that side as the entrance of wind pressure through the windows is sufficient to counteract the fan. In many such schools additional direct radiation has been installed to get sufficient heat. The remedy would better be secured by weather-stripping the windows and partially closing or reducing carefully the vent discharges of the room. The temperature of the hot air should be raised and the volume damper in this duct opened wide and those of nearby rooms closed as far as they will stand. The speed of the fan can generally be raised, but care must be exercised to cramp the volume dampers to avoid drafts in nearby rooms. When once so balanced it should remain so. If the speed is changed again at the end of stormy weather the volume dampers must be reset. The partial closing of the dampers does not proportionately reduce the air flow. It takes two persons to set volume dampers and an anemometer should be used to measure the velocity coming through the diffuser opening into the room. This velocity should be about 250 ft. per minute. 400 ft. will produce an objectionable draft. Defective thermostats that open the mixing dampers too rapidly will cause complaint because the tempered air is in excess for a moment and as a result it feels like a cold draft.

OPENING OF WINDOWS NOT ALWAYS EFFECTIVE.

Much abusive language has been induced by the rule to keep all windows closed while the fan system was in operation. This rule was necessary for the protection of the occupants of other rooms. The benefit from open windows is nearly all due to the effect on the mind resulting from the agitation of the subject. It requires great care and patience to convince teachers that a sufficient quantity of good air cannot be introduced into a school room without the fan. If the windows are open the air passes over the heads of the pupils and out of the windows leaving a stratum of quiet air at the desk level.

The smoke tests show the fresh air passing across the upper portion like a cloud and out at the open windows. Endeavor to get the teachers to a scientific attitude and to try experiments with a view of getting the truth. School rooms with all windows open and the fan running will have the characteristic odors of unventilated schools.

Another fallacy among all classes is that of lowering a window from the top to give ventilation. Pulling the upper sash down permits the warm pure air stratified near the ceiling to pass out leaving the polluted air of the room to remain. Pulling the upper sash down never ventilates but it cools the room. It is never proper except in very warm weather, then used for cooling the room. Rules should be made prohibiting it.

Where no provision has been made for ventilation, the windows should be provided with boards or glass set inside the sash to deflect the incoming air when the sash is raised.

If a room has been provided with a hot air supply but without a vent duct the room will not warm up without an exit for the air. In such cases a window may be raised three or four inches and a stop nailed above it to take the place of a vent.

In a plenum system designed without recirculating ducts the vent stacks must be kept open to permit the movement of air through the rooms. Frequent inspection should be made of the dampers to see that they operate freely. If one sticks or a diaphragm bursts some rooms will be cold. Valved vent registers should not be used as that will require a visit to every room before the rooms can be heated. Vent stacks that go straight up through flat roofs will permit cold air to flow down and chill the room at night. This is best corrected with a kind of cloth check valve fastened to the inside of the vent register. When the fan starts the cloth swings out to permit a free exit of air.

"STUFFY" AIR.

The word stuffy air is in common use and few persons are ready to give a definition.

There seems to be a notion that there is some mystery connected with air for breathing purposes that does not permit of a rational explanation. There is no such thing. Air is useful in ventilation for just two qualities which it has: It contains oxygen which the body takes to maintain its functions and it is a medium for removing the heat which is liberated from the body surface. In removing the heat the odors are likewise accumulated. Stuffiness is a condition due to too high temperature and odors, or it may be either cause may suffice to call forth that exclamation. Nearly all school rooms the world over are too warm. There is no vitalizing principle in air other than oxygen and the cleansing current of moving air.

Questions.

1—Why should the heating apparatus not require the attention of the teachers?
2—How can the teaching staff assist in the effective operation of the plant?
3—What are the most important points to be observed?
4—How is the building managed in a storm?
5—How do regulating vents affect the heating?
6—What precaution is given for changing fan speed?
7—What velocity of incoming air will make a draft?
8—What may cause a sudden change of temperature of the air?
9—Why should windows be kept closed?
10—What is the result of pulling down the upper sash?
11—How is a draft prevented when the lower sash is raised?
12—What is stuffy air?

BACK TO FIRST PRINCIPLES

An Elementary Course in Heating and Ventilating Engineering

Lesson No. 5—Ordinary Heating Methods

BY REID DAVIES

ORDINARY HEATING METHODS.

We have seen that the whole heating problem centers upon the maintenance of room air at proper temperature. Practical methods, at present available for this purpose, are limited to the following:

Stoves, burning coal or wood, usually stationary,
Open fire-places, burning coal or wood, stationary,
Oil heaters, usually portable,
Gas heaters, usually semi-portable,
Unit air heaters, usually stationary,
Air heating furnace systems, stationary,

Air blast heating systems, stationary,
Water circulation heating systems, stationary,
Steam circulation heating systems, stationary,
Pressure type,
Vapor type,
Vacuum type,
Electric heaters, usually portable.
Central station heating.

Of these, the first five mentioned are designed particularly for single-room heating. The open fire-place is thermally inefficient, troublesome, and dirty, but it has a psychological value which promises permanent popularity. Coal stoves, oil heaters, and gas heaters, while thermally efficient, require frequent attention, are dirty to operate, and involve some risk of explosion and fire.

Unit air heaters have advantages along lines of both efficiency and economy, since it is possible to provide all the elements of air conditioning, heating, humidification, purification, and circulation, in a single apparatus and to restrict this air conditioning to the rooms where it is required. The economy is attained in operating expense, since the equipment of a building with a complicated device of this character in each room where air conditioning is required, will obviously entail higher first cost than the installation of simple radiators. The efficiency is gained in the performance of three functions, essential to proper air conditioning, which a radiator can not pretend to accomplish efficiently.

Air heating furnace systems, air blast heating systems, water circulation heating systems, the various types of steam circulation heating systems, and central station heating are designed particularly for the heating of entire buildings from a central heat source by the circulation of a heat carrying medium through pipes or ducts. Eventually each produces a heating of room air, but the steps to this result are different in each system. Air heating furnace and air blast heating systems heat the air at the central point and force it through ducts to the various rooms to be heated. The water and steam circulating systems including central station heating, heat water or steam at the central point and circulate it through pipes to radiators in the various rooms, where the heating of the air is accomplished.

Electric heaters lend themselves with equal facility to either the heating of single rooms or the heating of entire buildings, since the heating element is capable of connection and disconnection, easily and quickly to the energy supply system, and since it is usual to draw the energy required for electric heating from the electric lighting circuit. Electric heating is the cleanest method possible and requires the least skill for regulation. Its cost, however, has prevented its general adoption up to the present, although there is continual growth in demand for this form of heating.

WARMING BUILDINGS WITH REFRIGERATING EQUIPMENT.

Before leaving this topic it will be interesting to touch upon a novel proposal made by Professor Robertson Matthews of Cornell University, to heat interiors by the use of refrigerating equipment. While this is scarcely a practical method at present, its engineering and scientific basis is sound and it will unquestionably become an accepted method as soon as its economic limitations have been established.

Considerably condensed, the suggestion of Professor Matthews is that we use an engine-compressor set to utilize the high head heat of the fuel and the low head heat of the atmosphere together for our interior heating requirements. The steps in this process are roughly, as follows: Thermal energy in the fuel is transformed in the boiler-engine, or in the internal combustion motor, into mechanical energy which operates the compressor upon a gaseous medium (commonly ammonia). Compression of the gas raises its temperature and this heated medium is utilized by means of pipe coils, to heat the air. The rise in temperature of the air is accompanied by a corresponding fall in temperature of the medium, and as this is cooled it changes to the liquid state, and is collected in a receiver. Its pressure is still high. From the receiver the medium passes through an expansion valve and as it expands its temperature falls to considerably below the temperature of the atmosphere. This very cold medium (again a gas, due to the expansion) is run through a second set of pipe coils situated in the path of the exhaust air from the interior. By this arrangement the cooling coils serve to create a down-draft, or suction, in the exhaust flue and at the same time the low head heat in this stream of exhaust air is used to supply a large measure of the thermal energy addition necessary to complete the cycle and bring the gaseous medium back to the compressor where we started, and ready to start again on the same cycle.

The subject of Lesson 4 will be ventilation and air purification, with the accent, as in Lesson 3, upon the human requirements.

Reference Books and Articles.

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Science of Ventilation, by Leonard Hill—British Medical Research Council.

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Heating and Ventilating Magazine, New York.

Air as a Conveyor of Heat, by S. H. Woodbridge, May, June, 1921.

Relation between Katathermometer and Thermometer Readings under Ordinary Indoor Conditions, Winslow and Hewitt, Mar., 1921.

The New Measure of Ventilation, by E. Vernon Hill, Aug. 1920.

A Study of Degrees of Discomfort, by J. W. Shepherd, Aug., 1918.

New Air Measuring Instruments, Sept., 1917.

Maximum Temperature in which a Workman can Work by F. L. Hoffman, Apr., 1917.

New Ideas in Air Conditioning, by W. E. Watt, Feb., 1916.

Questions.

1. How does heat get from place to place?
2. Explain the conduction process?
3. In what ways do thermal radiations resemble light radiations?
4. Explain the action of the wet-bulb thermometer?
5. Why does it measure "comfortableness" of air conditions?
6. What conditions affect human temperature requirements?
7. Describe the heat regulating mechanism of the human body?
8. Are temperature changes beneficial to health?
9. What are the most usual methods used in heating populated interiors?
10. How can a building be warmed with refrigerating equipment.

Insulation of Buildings from Heat and Cold.

The effect of building construction upon the heating or cooling problems in buildings is often more real than apparent. The *Journal* of the American Institute of Architects contained in a recent issue under its Structural Service Department, abstract of a letter from Dr. Charles F. Brooks, Associate Professor of Meteorology and Climatology, Clark University, touching upon this subject in an interesting way. He says, in part: *"Cold Floors.*—The ground floor of a cellarless house is usually cold in winter. If, however, the space under the house is tightly enclosed with a thick outer wall, and if the floor is quilted or otherwise protected against rapid conduction of heat through it, the floor should be nearly as warm as the air immediately above it, and there should be no up-drafts of cold air characteristic of unquilted floors over foundations of open construction. Nevertheless, the floor would undoubtedly feel cold, for the air in contact with it is the coldest in the room. The temperature of the air under the house would tend to be about that of the ground, which is close to the mean annual temperature (about 52° F. at New York City). In cold windy weather the air temperature under the house would probably be lower than in calm weather, when it is warmed to some extent by radiation and conduction of heat from the warmer floor.

"Attics.—The attic question in summer is different from that in winter, particularly in that the undesirable condition is next to the roof in summer and next to the attic floor in winter. With efficient outlet in summer, the need for large attic space to provide against overheating of the rooms below, would be dispensed with. In winter the larger space would be of questionable value, for the coldest air settles to the floor anyway. The specific heat of air is so small that the temperature of a large body of air in the attic would probably be about as low as that of a small body, and would change almost as fast.

"Insulating Attic Floors.—Since attics are usually either too hot or too cold, it becomes desirable to provide effective insulation between the attic floors and the ceiling of the room below. Quilting an attic floor would probably be more worth while than quilting the *ceiling* below, for this would provide an insulating space of more or less dead air between the floor and the ceiling below.

"Is Quilting the Best Insulator?—When quilting is used between boards or walls, it is bound to be compressed to such an extent that much of its value as an insulator is lost, though its effectiveness as a preventive of draught is not diminished. Air is notoriously a poor conductor of heat; therefore, the more air can be used as an insulator, the better. But air readily circulates when warmed below or cooled above, and to use its thermal conductivity most effectively, the range through which such convection must take place must be confined to as small compartments as practicable; as for example, in different degrees, in Balsa wood, pumice stone, surface cooled lava, and foam of any kind. For the best heat insulation, therefore, air spaces divided into cells with but small vertical dimensions are necessary; *e. g.*, honeycomb on a side, cardboard or paper tubing laid horizontally, or even well-mussed but not crushed newspapers.

"Heating of Roofs.—The heating and cooling of an attic in clear, calm weather is due almost wholly to the heating and cooling of the roof by radiaton, the efficiency of a surface as a radiator being about the same as its action as an absorber. Authoritative data on the relative heating qualities, in bright sunshine, of the various roofing materials and of paints of different colors, would be valuable to architects. For example, at Davos, Switzerland (altitude about 1 mile) the order of temperatures in boxes of different colors was from lowest to highest as follows: White pink, yellow, green, red and black. Painted steel blocks in Panama showed an order of temperature as follows: White, pink, red, yellow, green, and black. Blue was not tried in either place.

"Double Windows vs. Weather Strips.—Much of the loss of heat from houses in winter comes from conduction through windows. The air coming in contact with the windowpane is cooled, and becoming denser, falls to the floor while other warm air takes its place. Thus there is usually a continuous stream of cold air down from windows in cold weather, which no amount of weather-stripping can prevent. The value of weather strips is evident only in windy weather. Double windows, however, are as good as weather strips against strong winds, and always prevent the excessive cooling of air in contact with the inside window panes.

"Orientation of Houses.—Wherever feasible, architects would do well to depart from the usual practice of making houses face directly one of the cardinal points. If the house is made to face one of the four intermediate points, SW., say, the sun will shine into all the rooms on clear days practically throughout the year, instead of only six months of the year, if it faced a cardinal point. Another consideration in laying out the house, in the eastern United States at least, is that the living room should be on the southeast side; the kitchen on the northeast, and bed rooms on the northwest and southwest. Thus, the morning sun, in winter, will heat the living room; the cold winds of winter will blow against the kitchen, which usually tends to be too warm; the afternoon sun will warm the bed rooms shortly before time of their occupancy, and cold winds from the northwest need not be met with excessive effort to keep these rooms warm. During the hottest days of summer, the southwest winds, which usually accompany hot spells in most localities, will blow into the bed rooms. If there is a choice about the position of the longest roof slope, it will be found worth while, in regions of much snowfall in the East, to have it southeasterly. Most of the snow comes with northeasterly or easterly winds, which tend to sweep this side of the roof, and after the snowstorm, the melting of the snow would begin shortly after sunrise before the air temperature rose above freezing, and continue probably all day by virtue of the higher air temperature in the afternoon in spite of weaker sunshine on this slope."

The Trend in Methods of Pipe Identification.

The great variety of colors used, and an absence of uniformity or standard practice, in painting steam and other pipes for identification purposes has induced the American Engineering Standards Committee to take up the matter. The committee has asked the National Safety Council of Chicago and the American Society of Mechanical Engineers to act as joint sponsors and to organize a sectional committee for this purpose.

In commenting upon the use of colors to distinguish piping, especially in power houses and industrial plants, G. E. Sanford, safety engineer of the General Electric Company, is quoted in *Mechanical Engineering* as stating that there does not seem to be a sufficient number of satisfactory colors to go around.

TENDENCY OF COLORS TO FADE.

Two other important considerations in this connection, it is pointed out, are first, the tendency of certain colors to fade and in so doing to dangerously approach some other color, thus leading the workmen into a false sense of security; and, second, the prevalence of color blindness among workers of all classes. On this point Mr. Sanford says:

"From my experience in investigating this matter in plants all over the country, I am thoroughly of the belief that the best plan would be to paint a black band a foot more or less long on each side of each union, valve, or at any place where the pipe line could be taken apart, or at any place where attachments could be made. On that black surface should be stenciled in plain white or aluminum letters, at least one inch high where practicable, the name of the material in the pipe, so that markings on overhead lines could be read from the floor in ordinary well-lighted buildings, provided, of course, that the ceiling was not over the average height."

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IN accordance with our custom of several years past, THE HEATING AND VENTILATING MAGAZINE for September will be a Fuel Conservation Number. During the year that has intervened since our last Fuel Conservation Number some important developments have occurred, perhaps the most notable being the trend from down-draft to up-draft in the design of sectional-type house-heating boilers. In the power field the event of the year has been the advance in the use of powdered coal as a fuel. The significance of this development may be gauged from the remark of one prominent central station heating engineer who declared that new boiler installations should be designed with the distinct idea of "providing for the adoption of new practices in the burning of coal."

Comparatively little further progress has been made in the way of conserving the by-products of soft coal. Ambitious schemes to this end are on foot, however, and one typical plan, for use in connection with "block heating," will be presented in next month's issue.

On the general subject of smoke abatement, the agitation of this matter, which was largely suspended during the war period, is again coming to the front and will no doubt result in a stricter application of local smoke ordinances, and a consequent widening of the market for smokeless boilers. Another factor which is entering more and more into the situation is the failing supply of natural gas and the increase in the use of bituminous coal, due to the fact that the anthracite supply is not adequate to meet the increased demand, a fact which is reflected in the high prices of hard coal. So far, most of the smoke ordinances in effect exempt residences but it is easy to see that if soft coal is to be adopted on an extensive scale for house heating, in place of other fuel, the extension of the ordinance to cover residences is likely to become a live issue.

There is thus every indication that the heating trade needs to become thoroughly posted on the best means of reducing smoke and, at the same time, of conserving fuel, and next month's Fuel Conservation Number will be offered as a practical contribution towards that end.

IN spite of the fact that years of development have established the heating trade as a distinct industry, the impression still prevails to a wide extent, especially among laymen, that the heating and plumbing trades are more or less identical, that a heating man is necessarily a plumber and vice versa. This impression is due in no small measure to the practice among the plumbing trade papers of describing themselves as devoted to the plumbing and heating field, this, in turn, being based on the fact that so many of the smaller plumbing concerns are able to take care of the minor heating requirements in their own localities and develop what have come to be known as "combination shops." It is true that very often we find some of the largest heating concerns handling plumbing as well, but when this happens it will generally be found that such firms are really specialists for the entire mechanical equipment of buildings and have departmentized their business accordingly. They are, of course, not to be confused with the ordinary "plumbing and heating shop."

It is gratifying to find expert testimony on this point in the report of the Secretaries' Association of the Heating and Piping Contractors' National Association, which is all the more significant in view of their statement that "in our deliberations we have endeavored to get a clearer conception of the objects, make up, benefits and responsibilities of our organizations and this report is largely given over to the composite views of the secretaries."

In connection with suggestions for increasing the association's membership, the report then declares:

"All trade periodicals are desirous of securing information or news. If heating was specifically separated from plumbing as regards our activities and so impressed upon the publishers as a separate and distinct business, conducted by a great number of our members as such, I think it would impress many, who now run combination shops, with the advisability of joining when they now believe it ample to belong to only the Plumbers' Association.

AS we go to press, we are in receipt of the important announcement that Professor Paul Anderson, professor of mechanical engineering and dean of the School of Mechanical and Electrical Engineering at the University of Kentucky, has been appointed director of the Research Laboratory of the heating engineers' society, in Pittsburgh, succeeding the late Director John R. Allen.

WRINKLES

Method of Heating Railroad Passenger Stations.

A typical method of arranging radiation and piping for heating a railroad station by steam is shown in the accompanying plan (Fig. 1) of the New York Central Station at Beacon, N. Y. All mains and branches are laid under the floor and connected with risers to the radiators; consequently the boiler is placed in a basement provided for that purpose under the station. Open concrete trenches for pipes back of the seats are provided when the ground under the station is filled in.

The piping is laid out with equal runs and amounts of radiation, thereby securing practically the same results from each group of radiators. To decrease the size of the mains, they are divided into as many branches as may be found consistent with economy. This gives smaller pipe sizes, valves and fittings, together with the convenience obtained when making repairs to the system by the valving off of each branch. Full-sized valves are placed in all branches from the mains or headers and at the heater or wherever necessary to give perfect and interchangeable control of the entire piping system.

The radiation is distributed near windows and particularly near doors as in this class of work the air change from open doors is very large. Radiators are installed back of seats where possible, thereby not interfering with the neat appearance of the station. (See Figs. 2 and 4). No radiators or piping except those at doors are visible.

It will be noticed that the supply valves of two adjacent radiators are located between the radiators. The register, which is immediately above this point, is hinged in order to render the valves accessible. Also doors are provided at the ends of the seats for facilitating repairs and for giving access to the supply valves at these points. (See Figs. 3 and 5.)

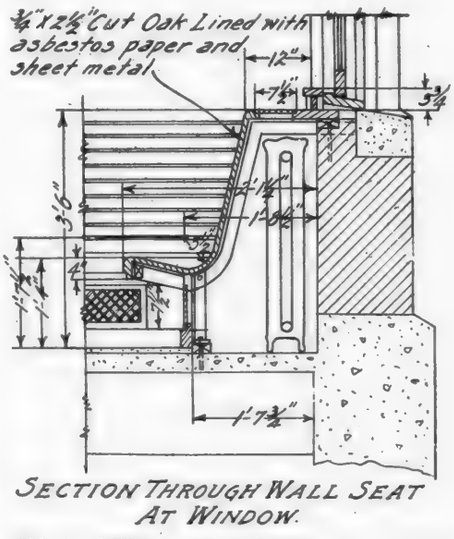


FIG. 2.—DETAIL OF RADIATOR LOCATED BACK OF SEAT.

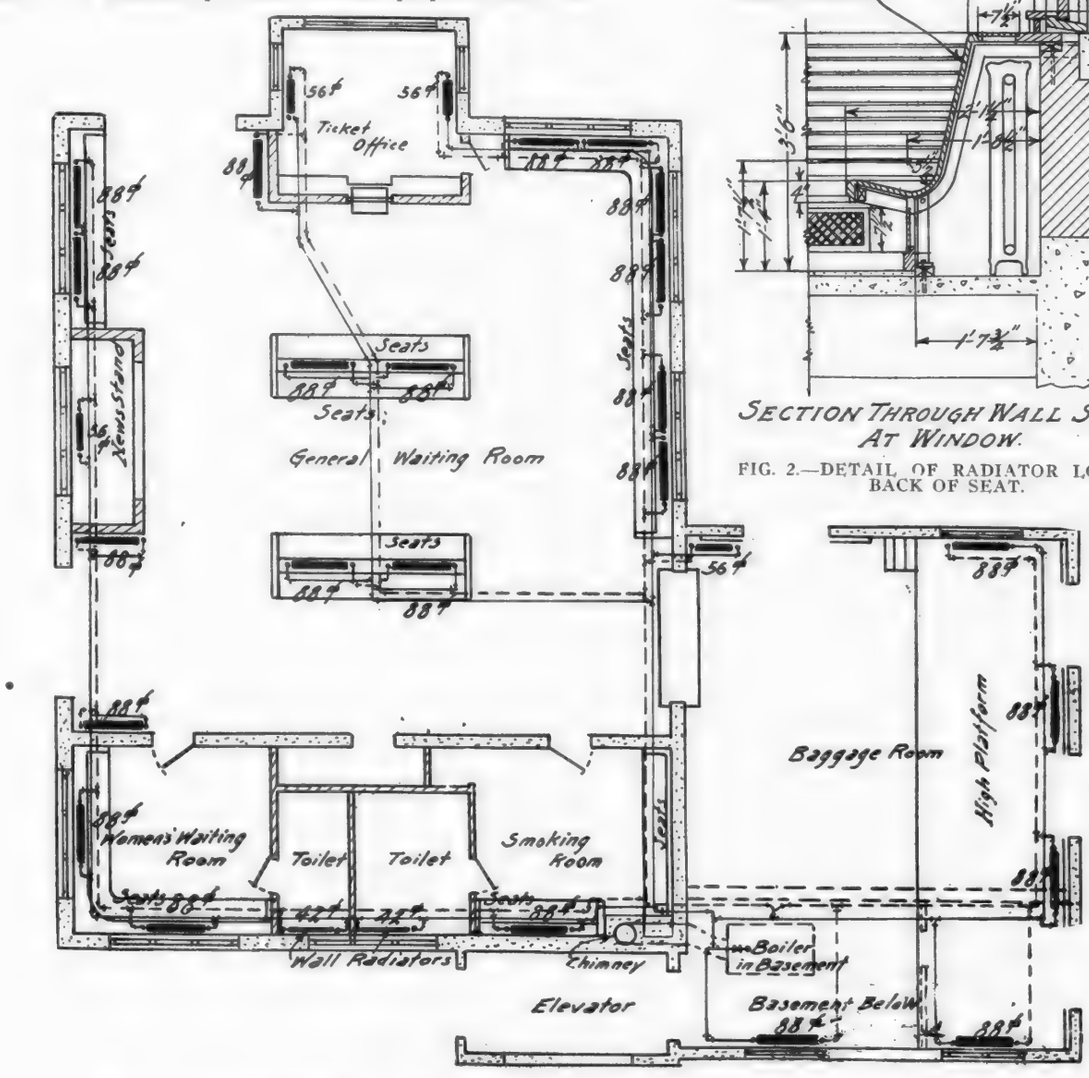
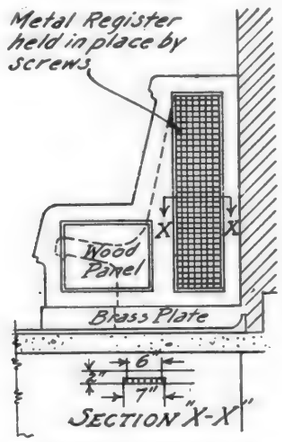


FIG. 1—TYPICAL METHOD OF HEATING RAILROAD PASSENGER STATIONS BY DIRECT RADIATION.

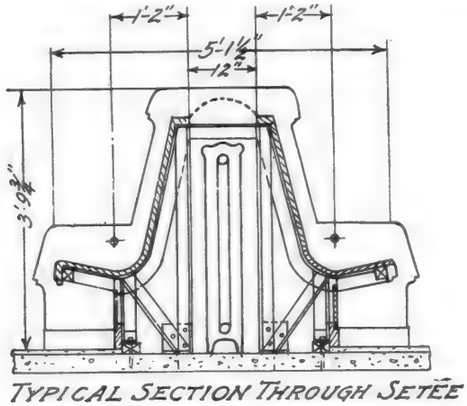
The woodwork of the enclosure is lined with asbestos and sheet metal.

For this type of installation, water radiators are more suitable. They are of stronger construction and permit the use of fractional valves at the top of the radiators, which is particularly desirable when radiators are located in such positions; the backs of the seat are usually 4 ft. in height. When steam radiators are used back of seats, the valves may be located at the bottom, in which case extension handles are connected to the wheel of each valve, reaching to the top of the seats. The valves are packless in order to insure a minimum of repairs in the confined space.



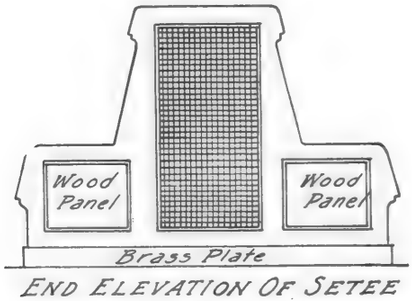
END ELEVATION OF WALL SEAT

FIG. 3.



TYPICAL SECTION THROUGH SETEE

FIG. 4.



END ELEVATION OF SETEE

FIG. 5.

All the radiation is 2-col., 38 in. high, with the exception of that in the toilets where, due to the lack of space, wall radiators are installed. The two-column type is chosen for its greater efficiency. All radiators, as near as possible, are standardized as to the number of columns, sections and height —those shown on the plan contain 88 sq. ft. of radiation each, which is a size of convenient bulk and not likely to be damaged in handling or shipping. The radiators are also arranged in capacity so that every other one may be cut out in milder weather. The connections and valves at the radiators are all of the same size and the entire system, therefore, may be quickly and readily installed by the contractor.

Pipe coils are usually installed in the baggage rooms since these extend out from the walls for a distance somewhat less than that required by radiators. This is important when one considers their liability to damage due to the handling of baggage. In the installation shown, pipe coils could not be used as they could not be provided with supports extending through the sliding doors shown on the plan, without interfering with their operation.

Where discoloration of the walls is objectionable, some sort of shield should be installed over the radiators, in particular when the walls are of marble tending to condense the moisture in the air currents over the radiator and deposit the dust picked up by these currents. When circular radiators are used, they should be screened over to prevent the public from using them as a receptacle for refuse.

CORRESPONDENCE

Pipe Sizes for One-Pipe Steam and Two-Pipe Gravity Up-Feed Water Heating Systems.

EDITOR HEATING AND VENTILATING MAGAZINE:

Will you kindly note on the following sketches (Figs. 1 and 2) the proper pipe and valve sizes, since there is so much information relating to the systems shown that one has to guess, if experience is lacking.

These two systems, one-pipe up-feed, with wet return, and two-pipe up-feed for hot water, are without specialties, but nevertheless are the most commonly used today. THE HEATING AND VENTILATING MAGAZINE seems to overlook these older methods and always mentions the special systems.

Cleveland, O. W. R. BIRCKS.

While there is some variance in the pipe sizes as recommended by various authorities, it will be found that it does not amount to more than one size for the same capacity. However, the present tendency in good engineering practice is towards standardization, such well-known authors as Thompson, Harding and Willard, and Fuller agreeing as to pipe sizes and other details for the two systems submitted by our correspondent. The pipe sizes given by these authors are those used by the United States Treasury Department in connection with the equipment of Federal buildings and, for this reason, were selected in determining the proper pipe sizes in the correspondent's sketches.

It will be noted that the layout of the one-pipe steam system, as shown in Fig. 1, is that known as the "circuit main" system, which has been used with much success. In this scheme, as illustrated, the radiator runouts, risers and branches are left pitching down from the radiators and against the steam flow, but the steam main—the point of greatest trouble—is pitched with the flow of the steam so that the condensation flows along with the steam, instead of against it. At the end of the steam main a drip pipe, or "bleeder," is dropped down below the water-line in the direction indicated by the arrows. The pipes are pitched down in the direction indicated by the arrows. All pockets should be avoided by the use of eccentric fittings or flanges.

With the exception of the runouts and riser branches, all of the condensation flows with the steam and, as long as the risers do not get too large, that is, have too much radiation

placed on them so as to produce an excessive quantity of condensation flowing back, there should be no difficulty experienced with this piping arrangement.

The steam runouts from the steam mains to the risers or radiators should be inclined down from the radiator or riser to the main and should enter the main at 45°, thus allowing the return condensation to flow along the bottom of the runout and down into the steam main without cutting across the path of the steam flow to the main.

An automatic air valve should be placed where the steam main drops down under the water-line to relieve the air caught between the advancing steam and the water-seal, when starting up the system.

In all one-pipe work, the steam connection to the radiator is practically the same. The connections must be made at the bottom and must be controlled by a gate valve or angle globe valve looking down, both of these points being determined by the necessity of accommodating the flow of the condensation out of the radiator.

The standard of steam main sizes recommended is that in which the maximum velocity permissible will not require more than 1 oz. drop in pressure for 100 ft. run in straight pipe to maintain it. It may be advisable to use a lower velocity in many cases, but it is believed that this velocity cannot be exceeded with the best results. All steam mains, risers and radiator connections within buildings of ordinary size may usually be laid out with this maximum velocity. The sizes for one-pipe systems, as given by Thompson for the United States Treasury Department, are listed in Table 1 for steam and return mains, and in Table 2 for branches, risers and tappings.

It should be remembered that in addition to the permissible friction pressure drop betwen the boiler and the last radiator in a steam system, the outlets of the boiler should be large enough to prevent the velocity through the outlet from lifting water into the mains. Also, in one-pipe systems the steam flowing up the risers must not carry back the down-coming condensate. These conditions are met by low velocities, ranging from 12 to 16 ft. per second, but there are still further limitations. Unless the piping has been designed for a reasonable loss of pressure by friction, small mains and an excessive pressure drop may cause a corresponding elevation of the water in the returns to flood the extreme end of the steam main. For this reason it is customary in most heating systems to keep the steam main or lowest level of radiation at least 24 to 30 in. above the water-line of the boiler.

SIZING PIPING FOR WATER HEATING SYSTEM.

Fig. 2, as submitted by the correspondent, shows an up-feed system with two-pipe basement mains and open expansion tank. The flow and return pipes are run close to the basement ceiling, the flow main grading up from the boiler and the return down toward the boiler, each ¾ in. in 10 ft. This system should be installed, not exactly as shown, but with a reversed return, (the first riser on the supply main becoming the last on the return main) in order to make the water travel and resistance to flow for each group of radiators about the same. Each group of radiators will then warm up at practically the same rate.

Owing to the fact that there is a greater tendency of the water to circulate to upper radiators than to the lower, because of increased head caused by additional height giving a greater velocity in the high risers, the lower radiators must be served in some manner to insure their receivng the proper circulation in spite of their lower elevation. This is a matter which is well taken care of by means of Table 3* of direct radiator tappings. In this table, each radiator is treated as a separate proposition and handled entirely on the basis of its size and elevation above the boiler, this treatment being carried back through the riser and mains by means of the pipe equations used to size the risers

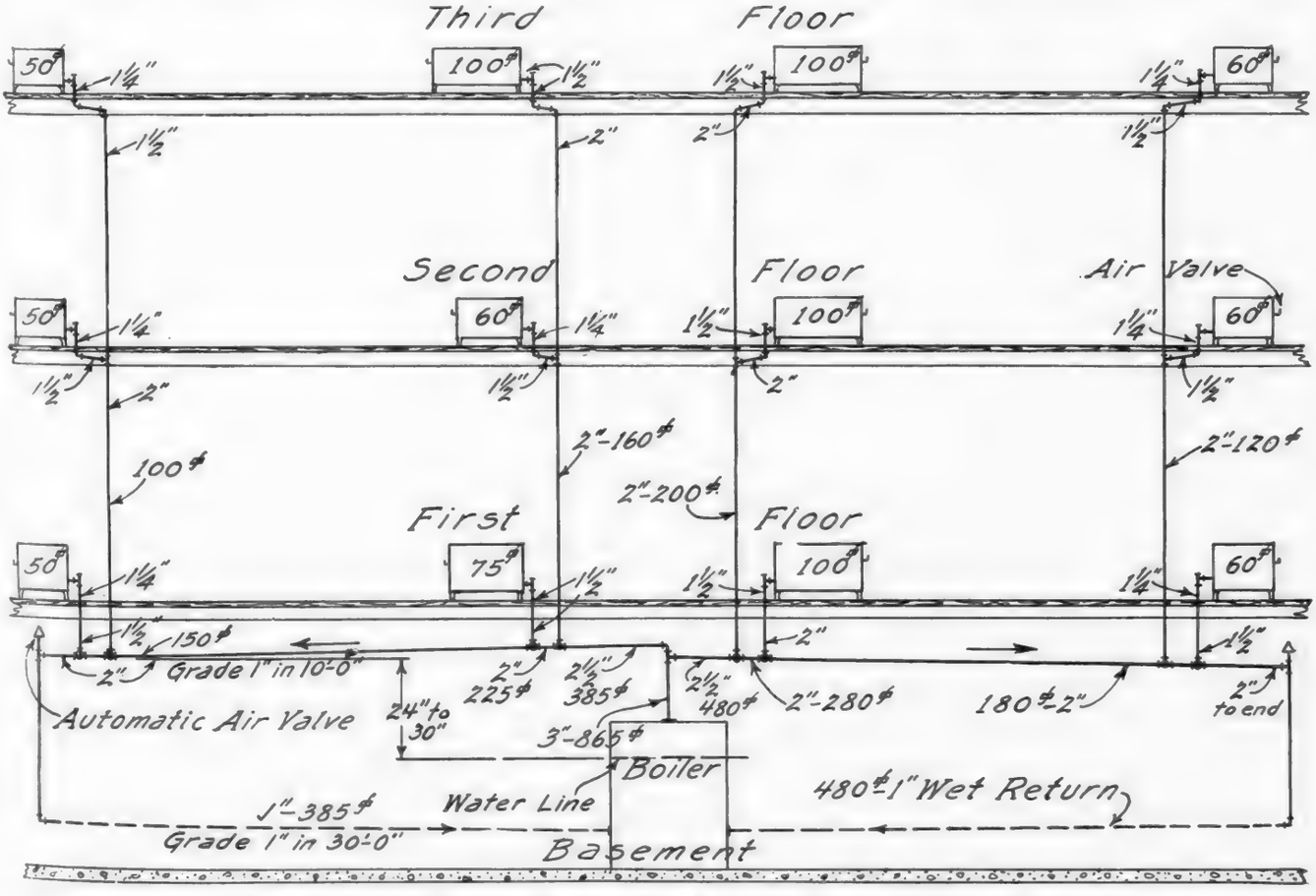


FIG. 1—PIPE SIZES ON ONE-PIPE, UP-FEED STEAM HEATING SYSTEM WITH WET RETURN.

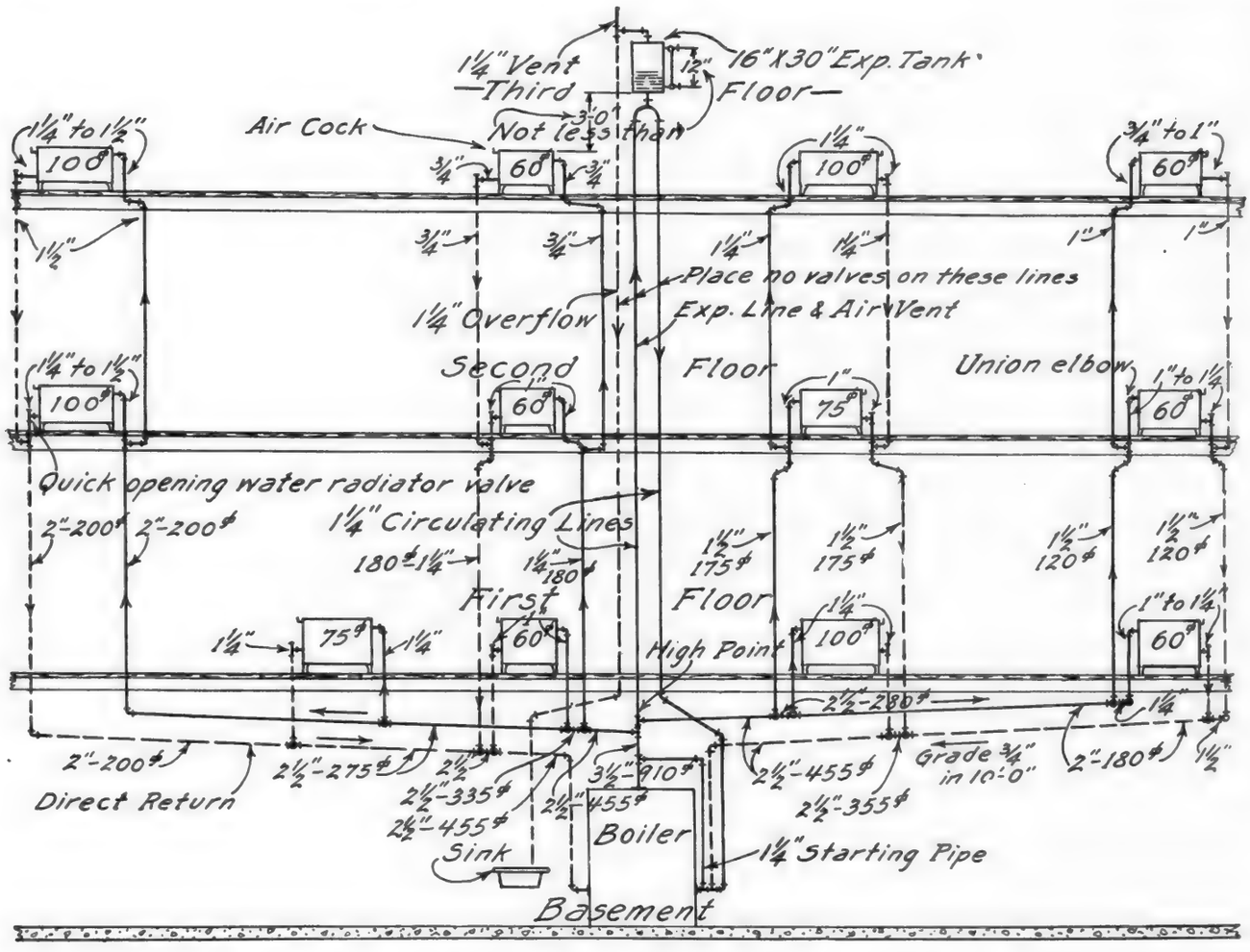


FIG. 2—PIPE SIZES ON TWO-PIPE, GRAVITY UP-FEED WATER HEATING SYSTEM.

and mains (Table 4)*. The flow and return radiator tappings at ends of mains should be increased one size, as in Fig. 2. No main to be less than 1¼ in.

For small systems it is often unnecessary to go into much detail for the sizing of pipes, a common method being to take the direct radiator tappings, or what amounts to the same thing, the valve areas of the valves on the radiator supplies and making the size of mains equal to the combined areas of all the valve supplies. Thus, to obtain the size of pipe to serve a ¾-in. pipe and a 1-in. pipe, use Table 4 and add 5 for the ¾-in. to 10 for the 1-in., making 15, which is equivalent to nearest size of 1¼-in.

METHODS OF CONTROLLING THE FLOW TO WATER RADIATORS.

Even with the mains and risers sized by the methods shown, the tendency is for the hottest water to seek the top radiators, making it necessary to use various expedients to control the flow and to induce a proper circulation. In the lower radiators. A special fitting (O. S. fitting) designed for just such conditions, will induce a flow into the radiator at the level where the fitting is located, in preference to flowing up the riser to the higher points.

Pipe connections to produce the same results even more positively are shown in Fig. 3 where the hot water in rising to the top of the pipe is left only one place to go (into the radiator) while the supply for other radiators above is taken from the side of the riser lower down as shown; these connections are repeated at each of the lower radiator connections, but need not be put in on the upper levels, as these radiators do not need favoring.

Similar results are obtained in the horizontal mains where the risers are branched off, as shown in A, B and C in Fig. 4, Detail C being used for about one-third of the risers nearest to the boiler (which would otherwise obtain the hottest water and the best circulation), Detail B being used for about one-third of the risers located midway between the boiler and end of the main, and Detail A for the last third of the risers at the far end of the system.

Connections to radiators for the supply should be made at the top, using a union elbow. The return connection is made at the bottom and should be equipped with a quick-opening water radiator valve, with union connection. Only one valve is required to control the radiator with this arrangement.

Special control valves are by far the most satisfactory of all methods of controlling the circulation as they may be set in any graduated degree desired or left open entirely, if the circulation is satisfactory. It is indeed a question (when the extra cost of special fittings or special pipe connections is considered) if the control valve is not very nearly as cheap as any other method of control—certainly its results are much superior. A gravity water heating system without control valves is much like a ventilating system without volume dampers.

If the key-operated (lock-shield) valves are placed on the return connection of each radiator, and the rest of the piping is designed with proper pitch and so as to avoid air pockets, no further precautions need be taken, for all that is necessary to do is to begin at the hottest radiators and gradually close the return valve until the resistance to the flow of water through them is

* Thompson—Mechanical Equipment of Federal Buildings.

sufficient to induce a circulation in the other radiators not receiving their full quota. After once adjusting the system in this manner the return valves can remain set permanently and the radiators controlled by the supply valves.

All radiator valves for hot water should have a ⅛-in. hole drilled in them so that the circulation in the radiator will never be entirely stopped even when the radiator is closed off. This will prevent damage by freezing under any ordinary conditions.

TABLE 1. PIPE SIZES FOR ONE-PIPE SYSTEMS.

Steam Main	Return Dry	Return Wet	Rad. Sq. Ft.
1"	¾"	¾"	40
1¼"	1"	¾"	75
1½"	1"	1"	126
2"	1¼"	1"	286
2½"	1½"	1"	535
3"	1½"	1"	890
3½"	2"	1"	1360

TABLE 2.

Square Feet	Tapping	Riser & Arm in Basement Main & Radiator Arm
0-20	1"	1"
21-24	1"	1¼"
25-40	1¼"	1¼"
41-60	1¼"	1½"
61-80	1½"	1½"
81-100	1½"	2"
101-200	2"	2"

TABLE 3—DIRECT RADIATION TAPPINGS FOR TWO-PIPE GRAVITY HOT WATER BASEMENT MAINS.

First Floor	Second Floor	Third Floor	Fourth Floor	Pipe Size
40	50	60	70	¾"
70	80	90	100	1"
110	120	135	150	1¼"

When the main is reduced in size at any point, an eccentric fitting should be used to keep the top of the large and small mains in the same place and to avoid air pockets. Free and complete drainage must be provided for so that when draw-off cock is opened at the boiler the entire system can be emptied of water. A starting pipe installed between the flow main and return rear boiler is intended to assist in establishing an initial circulation between the two mains. This pipe is often used for under-food systems and varies in size from 1¼-in. in small

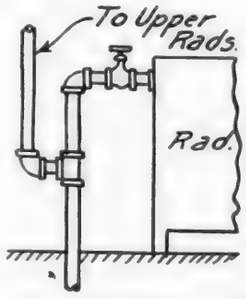


FIG. 3—PIPING CONNECTION TO FAVOR LOWER RADIATOR.

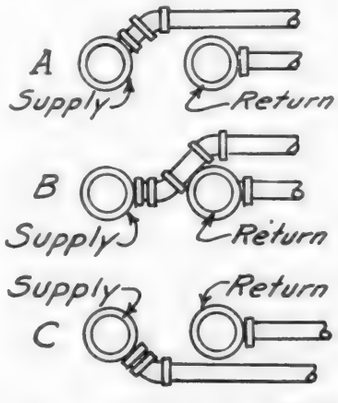


FIG. 4—METHOD OF BRANCHING OFF RISERS FOR EVEN DISTRIBUTION.

plants to 2½-in. in large installations.

DETERMINING THE SIZE OF EXPANSION TANK.

The expansion tank should be large enough to contain all the excess water due to expansion plus about 50%. The increase in the volume of water from 40° to 212° is approximately 4.2%, so that for every 23 gal. of water in the system an allowance of at least 1 gal. must be made in the expansion tank—practically a 2-gal. allowance should be made, the tank being filled one-third. The internal volume of the radiation is generally assumed to be about 50% of the total volume in the system. For ordinary small systems many manufacturers rate their expansion tanks in square feet of radiation, about 1 gal. to 30 sq. ft. radiation up to 1000 sq. ft., a typical list being given in Table 5.

For large systems the quantity of expansion should be calculated. This can be approximated by allowing 1½ pints of water as contained in each square foot of radiator surface, add

TABLE 4 PIPE EQUATIONS FOR MAINS AND RISERS.

¾"	equals	5
1"	"	10
1¼"	"	20
1½"	"	30
2"	"	60
2½"	"	110
3"	"	175
3½"	"	260
4"	"	380

TABLE 5. CAPACITY OF EXPANSION TANKS.

Size in Inches	Cap. Gal.	Rad. Sq. Ft.
10X20	8	250
12X20	10	300
12X30	15	500
14X30	20	700
16X30	26	950
16X36	32	1300
16X42	48	2000

25% for the water in the piping (or calculate the exact quantity in the piping if the system is designed and all lines sized) and add one pint for each square foot of heating surface in the boiler.

For additional information on the subjects of steam and water heating the correspondent is referred to Data Sheets Nos. 129 to 129-I for Steam and Nos. 133 to 133-N for water.

Chicago Meeting of American Society of Mechanical Engineers.

No less than 1235 members and guests attended the spring meeting of the American Society of Mechanical Engineers, in Chicago, May 23-26. Among the papers presented were:

"Recording Ash-Pit Loss from Chain-Grate Stokers," by E. G. Bailey.

"Boiler Tests with Pulverized Coal," by Henry Kreisinger and John Blizard.

"Limitations of Mechanical Stokers Utilizing Mid-West Coals," by E. H. Tenney.

"Capacity and Efficiency Limitations of Stokers Using Mid-West Coals," by John E. Wilson.

"Smoke and Its Relation to the General Health of the Community," by Dr. John Dill Robertson (presented by Dr. E. Vernon Hill.)

"The Latest Requirements of the City of Chicago in Furnace Design, with Special Reference to Hand-Fired Boilers and Limits of Each Design," by Frank Chambers (presented by R. H. Kuss).

Mr. Kreisinger supplemented his paper with particulars regarding the new Lakeside plant of the Milwaukee Electric Railway and Light Company. This plant contains eight boilers, each with 13,060 sq. ft. of heating surface and burning about seven tons of coal per hour when operated at 300% rating. In one 24.5-hr. test recently made at 136% rating, the remarkably high thermal efficiencies of 85.6% and 90.2% were respectively obtained for the boiler alone and for the boiler and economizer combined. In this test the CO_2 at the boiler uptake averaged 16%, and in the gases leaving the economizer, 13.2%.

The gas temperatures were 432° leaving the boiler, 392° entering the economizer, and 205° leaving the economizer.

All of the papers above mentioned were presented at a fuel session which was presided over by Joseph Harrington.

THE WAGE REDUCTION MOVEMENT IN THE STEAM FITTING TRADE

So important have been the wage problems confronting the heating contractors, especially in view of the wide-spread business depression, that a summary of the situation as brought out at the recent annual convention of the Heating and Piping Contractors' National Association and reported in detail in the Association's *Official Bulletin,* will have an interest for almost everyone connected with the trade.

The conditions existing in a number of different localities were discussed by those who had just come from the districts in question. In every case, it was shown, a reduction in the wage scale had been effected and in numerous instances, open-shop policies had been adopted.

In Buffalo a cut from $8.00 to $7.20 for the steam fitters was accepted, after a number of conferences, this scale to remain in effect until January 1, 1922.

Denver has reached an agreement on the basis of $8.50 per day for fitters, and $5.40 for helpers, double time for overtime; closed shop.

Syracuse, N. Y., has reached an agreement of $9.00 for a fitter and $6.00 a day for a helper. Double time for over-time; closed shop. This agreement expires November 1, 1921.

Memphis, Tenn., is now paying $8.00 a day for a fitter and $4.00 a day for a helper; double time for over-time.

Utica, N. Y., is operating at present on the open-shop basis of 85 cents for the fitter and 45 to 50 cents for the helper.

Atlanta, Ga., has the open shop, with $8.00 maximum for the fitter per day and $4.00 for the helper. Time and one-half over-time up to midnight.

Indianapolis has made an agreement which expires April 1, 1922, whereby the rate per hour for the fitter is $1.15, instead of $1.25, and 65 cents for the helper, instead of 67½ cents. Double time for over-time.

In Pittsburgh, a proposition to reduce the fitter's rate from $10.00 to $8.00 and the helper's rate from $6.40 to $4.80 resulted in a strike when the old agreement expired May 31.

Philadelphia, which is on an open-shop basis, pays its fitters $7.20 per day and its helpers from $4.00 to $4.50.

In Boston a drop in wages was put into effect in January of 90 cents per hour for a fitter, instead of $1.00, and a 10-cent drop per hour from the old rate for all of the helping and laboring class. This resulted in a long drawn-out strike which lasted until June, when the men commenced to go back to work on the new rate.

In St. Louis, at present, the rate for a fitter is $1.25 and for a helper, 75 cents. At present there is a closed shop; no agreement.

Memphis is an open-shop city since April 1, excepting the bricklayers and plasterers. The wages for steam fitters are $1.00 an hour.

Newark, N. J., is reported as practically open-shop, with the exception of the painters and carpenters. The wages for steam fitters have been fixed at $8.00 a day and for helpers, at $5.00. This is a reduction from $10.00 and $7.00 respectively.

In New York, it was shown, the present rate for a fitter is $9.00 per day and for a helper, $7.00. The present agreement runs until December 31, 1921.

HOW PITTSBURGH IS DEALING WITH LABOR.

Interesting details of the way the employers in some of the cities are dealing with the men were given in the published Proceedings. In Pittsburgh, for instance, an important step was taken by the Building Trades Employers' Association in drafting a uniform agreement embodying a standard wage scale which was set at $1.00 an hour with the exception of bricklayers at $1.25, leaving the helpers' wages to the different trades. The same working hours for all of the trades were embodied in this uniform agreement. Over-time was fixed at time and one-half, with no work on certain holidays. The agreement provided that there should be no jurisdictional disputes, provision being made that such matters should be referred to an arbitration committee. The agreement also provided against sympathetic strikes. As stated, the uniform agreement was not accepted by the workmen who went on strike.

BUSINESS MEN'S ASSOCIATION IN ROCHESTER.

A step out of the ordinary has been taken in Rochester where there has been organized the Rochester Association of Business Men, including those who furnish the money for building, as well as many factories and plants, including the Eastman Kodak Company. This association employs a walking delegate to supervise generally the labor situation in Rochester, not only in the building trades, but in other lines. The Employers' Association in Rochester then met and drafted a uniform agreement, with uniform clauses as to arbitration, cutting out the building trades council and sympathetic strikes. They then met jointly with the Rochester Association of Business Men and had the contract agreement approved by the men who were going to spend the money on building. It was agreed that if the unions would not sign the agreement as presented to them, the Building Trades Employers' Association would sign no agreement with any labor organization in the building trade before April 1, 1922.

THE OPEN SHOP IN PHILADELPHIA.

Philadelphia has been on the open-shop basis since 1903. At a meeting about a year ago held before the Industrial Relations Committee of the Philadelphia Chamber of Commerce various phases of a comprehensive plan for dealing with labor were discussed, finally bringing the remark from the chairman, who is the vice-president of one of the large car-building companies: "Where would you begin with a campaign as extensive as that outlined?" This brought the rejoinder, "Begin with the president of our largest trust company." "What has he to do with the building industry?" it was asked. "It is the largest lender of money on building operations and developments," was the answer, "and it always couples with every contract for a loan of money for a building operation a clause that no extension of time on the loan will be made because of strikes or delays. The unions know that and the less scrupulous leaders take advantage of it, so that the builder has on one hand the banker forcing his hands for the payment of interest and the taking over of the entire loan, whether he can use it or not, and the union harassing him for all sorts of exactions and conditions. We have got to bring the bankers, manufacturers and business men into line with us. It is too big a problem for the building trades alone."

Out of that meeting, it was stated, has developed the Master Builders' Exchange of Philadelphia. After a number of conferences, in which the trade unions participated, the Builders' Exchange published a schedule of rates for all trades. The agreement, containing this schedule provided that there should be no jurisdictional disputes and no sympathetic strikes of any kind, together with no condition fixing absolute union domination. As a result of this move, Philadelphia has continued on an open-shop basis. If there is plenty of work the shops are comparatively free of union men, but if work is slack, they come back.

THE SITUATION IN CHICAGO.

In Chicago the men went out on strike April 30 because the employers would not agree to an increase in the fitters' rate to $1.25 from $1.00. The employers had offered to renew the old agreement at the same rate of $1.00.

STATUS OF THE STATE INDUSTRIAL COMMISSION IN COLORADO.

A somewhat unique state of affairs was reported from Colorado where the State Industrial Commission plays an important part in labor affairs. It seems that in Colorado no employer is permitted to change the wage conditions and the working conditions of his employees without 30 days' notice to the commission, and, likewise, no group of workmen or employees is permitted to strike or to change its rate of wages and conditions without first giving 30 days' notice to the commission. If the men undertake to do so, by strike or other means, they are immediately in contempt of court and are proceeded against and forced to resume the original conditions. As soon as the State Industrial Commission receives the proper notice from either group, it notifies the other party to file any answer it may see fit. At the time of the meeting either party may reserve the right to refuse to abide by the findings of the commission, but if both parties agree to abide by the decision of the commission, the commission has the power to enforce its

decisions. This does away with short notice, or no notice at all, jurisdictional strikes and gives considerable relief in that respect.

This year the Master Builders of Denver filed a notice with the State Industrial Commission that they would ask for a 20% reduction in wages in all branches of the building business. The wages for fitters and helpers were $9.50 and $6.00 per day, respectively. Before the hearing before the commission, practically all of the crafts, including the steam fitters, arrived at an agreement, which was made on the basis of $8.50 per day for the fitters, and $5.40 for the helpers.

This agreement refers only to the matter of wages, with no mention of whether union men shall be employed exclusively or not. As a matter of fact, however, Denver is a closed-shop city, with the exception of a few trades and, as a rule, the fitters employed are union men. The important point regarding the arrangement is that as both parties have agreed to the settlement made by the State Industrial Commission, the commission can compel both parties to live up to the agreement.

THE SITUATION IN BOSTON.

Boston had this year, for the first time, a clash between the Employers' Association, which is composed of practically all the building crafts, and some 26 unions affiliated under the Building Trades Council. These two bodies had entered into a contract which extended over a period of 18 months, expiring December 31, 1920. Boston was thus one of the first to meet the question of readjustment of wages in the building industry. Both parties appointed committees which, however, could not reach an agreement, the steam fitters wanting a raise from $1.00 to $1.50. Finally the employers' association established a rate of 90 cents an hour for all of the major crafts, to be in effect for one year, together with a reduction of 10 cents from the old rate for all of the helping and laboring classes. The agreement provided for time and one-half for all week-day over-time, double time for Sundays and holidays and a fixed 44-hour week for every craft. A strike immediately ensued which was still in effect at the time of the convention, June 1.

It was brought out that the Boston employers have not declared for the open shop, although it is possible for almost any shop in that city to operate on the open-shop principle.

CLEVELAND'S RETROACTIVE AGREEMENT.

According to the agreement which was made in Cleveland three years ago between the employers and the workmen, if there was no settlement at the expiration of any particular period, operations were continued at the old scale while negotiations proceeded, with the understanding that the decision reached would be retroactive. When wage increases were in order, the problem was comparatively simple but in lowering the employment rate it was realized that it would be a difficult thing to procure reimbursement to the employer for over-paid wages. A wage commission was formed by the employers in March which fixed the rates at $1.00 maximum for all of the trades, instead of $1.37½ which had been paid to the pipe trades, the electricians, plumbers and steam fitters last year, and proportionate decreases in other trades. This brought on a strike which was in effect at the time of the convention, June 1. It was later settled by the workmen agreeing to a reduction of 17% in their wages.

DETROIT OPERATING UNDER "AMERICAN PLAN."

The so-called "American plan" is in effect in Detroit, which provides for no discrimination between union and non-union men. The employers maintain an employment bureau, where all applicants sign cards and agree to work with any and all mechanics on a building, whether they belong to a union or not. The rate is $1.00 an hour for steam fitters and 62½ cents an hour for helpers.

On the other hand, the larger class of buildings under construction in Detroit are being built on the closed-shop basis. The Detroit employers do not feel very kindly, it was stated, to out-of-town contractors who go there and take contracts but who are not attempting to work under the "American plan." The facts are, however, that many of these large buildings do not originate, in a way, in Detroit. They have outside architects and outside contractors and are figured away from the city of Detroit. The local men are not even invited to bid on them. To do one portion of the work in these buildings under the "American plan" it was claimed, is impossible when the balance of the building and all of the other contractors are operating on a closed-shop plan.

IMPORTANCE OF GETTING SUPPORT OF ARCHITECTS.

In Memphis, it was reported, after the Builders' Exchange and the Building Trades Council had failed to agree, the matter was finally turned over to a committee of five for arbitration. One of the members of the arbitration committee was an architect, representing the Architects' League. This committee tried for several weeks to settle the question and finally had to give it up and report back that they favored a 20% decrease in wages. The question has now simply been settled by the public itself. The protection that the contractors receive is that it would be hard for a contractor who is employing union men at the old scale to secure a contract from the architect.

Trade Extension Bureau Gathering Data on Apprenticeship Question.

The gathering of data on the apprenticeship question and the distribution of such information to the trade will be the purpose of a new department of the National Trade Extension Bureau. Men in close touch with working conditions in the heating and plumbing industries realize that for some time we have not, as a rule, had either quantity or quality of apprentices in heating and plumbing establishments.

The following figures will indicate the need of concerted action concerning the apprenticeship question. The number of journeymen in these two trades is at present 73,000, as compared with 87,000 enumerated in the census of 1900. The number of registered apprentices from the best figures available, is about 3600. This illustrates that the heating and plumbing trades are fast reaching a stage where they cannot supply the demands for heating and plumbing service. It is also apparent that in the face of a building shortage estimated to be in the neighborhood of 2,400,000 dwellings, and of a public with a better knowledge of the necessity of healthful indoor conditions than ever before, we will need an increasing, rather than a decreasing number of men to do the work. In other words, we are losing the economic balance.

It is the purpose of the bureau to outline a definite program to take care of the future of these two industries. To accomplish the best results, the co-operation of the trade generally is being solicited. Letters are being prepared and sent out to all the various associations. The department also solicits suggestions from indivduals and states that it will welcome any letter sent. The address of the National Trade Extension Bureau is Evansville, Ind.

Boiler Manufacturers Co-Operating with Heating Contractors' Association.

Progress in the negotiations between the Heating and Piping Contractors' Association and the National Boiler and Radiator Manufacturers' Association was indicated in the recent report of the heating contractors' Conference Committee which stated that "while we have very little information to give you at this time covering our deliberations, we do wish to assure you that we have strong hopes that ultimately many of these seeming differences between ourselves and these manufactures will be disposed of in a manner agreeable and acceptable to all concerned."

Early in the year, the heating contractors' Conference Committee submitted a brief to the boiler manufacturers, embodying many subjects which, while admittedly of mutual interest, called for very careful consideration on the part of the boiler manufacturers. The boiler manufacturers' brief, covering their views on the subjects under discussion, it was stated, is now before the Conference Committee for consideration.

L. A. Waldrop Heating Co., Atlanta, Ga., was the low bidder for the heating of the Federal Reserve Bank building to be built in Atlanta. Other bids were: Loftis Plumbing Co., $28,147.25; Gresham-Jackson Co., $29,259; Jennings-Gresham Co., $29,898; Boatenreiter Plumbing Co., $26,285; Belcher Plumbing & Heating Co., $38,295.65; Walker Electric & Plumbing Co., $29,985; Fred Cantrell Co., $30,798.75; Farrell Plumbing & Heating Co., $33,000; Englehardt Co., $35,000.

HERBERT HOOVER ON THE DOMESTIC COMMERCIAL SITUATION

Some timely comments on the domestic commercial situation were made by Herbert Hoover, Secretary of Commerce, in an address before the National Association of Real Estate Boards, in Chicago, as late as July 15, in which he said, among other things:

"Obviously one of the most difficult problems in front of the entire country is that of housing. I need not recount to you that the cause of this critical problem has been the diversion of our economic strength from permanent construction to manufacture of consumable commodities during and after the war. In 1910 we averaged 110 families for each 100 homes and in 1920 about 117 families. This indicates a shortage of nearly 1,500,000 homes even on the 1910 standard. An equally disturbing fact is that the tentative figures from the forthcoming census indicate that the total number of homes owned by the occupiers has steadily decreased, and a total of nearly 60% of our population are living as tenants, a larger ratio than many other countries. If we are to build up the stability and the happiness of our people, this is just the reverse of what should happen. Nothing is worse than an increased tenantry and landlordism in the country.

GOVERNMENT NOT TO GO INTO HOUSING BUSINESS.

"If we make a study of the suggested remedies for the situation we find they fall into two general groups—first, those that may be worked out by individuals or local community action, and, second, those involving the assistance of the Federal Government. As to the latter, I wish to say definitely that the Federal Government has no notion whatever of going into the housing business either directly or indirectly. It will not fix prices nor wages. There are, however, three fields in which the Government can be of important assistance.

"First, the Government must as a matter of primary duty drive every combination out of business that attempts to restrain trade. Second, the Government to some degree directly or indirectly controls or obstructs the flow of credits and it therefore has a responsibility toward this part of the problem. Third, the Government can and should interest itself in dissemination of information, in scientific study of certain problems in materials and methods, and in co-operation with the industries to receive voluntary reduction in wastes, that the costs of homes may be decreased.

In the matter of credit the Government has considerable responsibility and must take constructive action to remove obstacles to which it is a party.

I do not think you will disagree with me in the statement that the tax-free security has materially diverted capital that would otherwise be available for the building industry, and has resulted in increasing interest rates to home builders.

I think you will all agree with me that the chief reliance for home building must be upon our saving institutions. If we examine these institutions, we will find that the total sum of money available of this type, either in mutual savings banks, building and loan associations, or in savings departments of national or state banks and trust companies, or in the assets of our insurance companies, will all aggregate somewhere about $22,000,000,000. If we eliminate the building and loan societies who obviously devote all of their assets to building and the actual savings banks who devote from 40% to 50% of their deposits to this purpose, we will find that the savings departments of the national banks, of the State banks, of the trust companies and of the insurance companies, which comprise more than one-half the total savings, probably do not loan for home building more than 10% or 15% of their deposits or savings assets. There has been a tendency during the last few years for the savings of the people to go in an increased proportion into this latter class of institution, and to journey thence into commercial paper, bonds, etc., rather than into home building.

"This diversion of savings money into commercial channels has been a very natural shift to higher rates of interest in times of great commodity movement. If we examine the forthcoming census figures we will find that the average interest paid by home owners for loans is less than 6%. However, the regular procession of an economic depression is, first, the lowering of prices and volume of production with consequent reduction in amount of capital needed and a falling rate of interest. We should expect this to happen again and interest rates to fall to the reach of the home builder with increased sums available for building.

ENDORSES WIDER USE OF SAVINGS DEPOSITS OF NATIONAL BANKS FOR BUILDING.

On the other hand, I believe that we should have a very much more stable economic system if we had a more regular proportion of our savings available to home building. There is, in fact, no other economic fund than our savings institutions from which our home building can be safely secured. It would seem to me, therefore, highly desirable that the amendment proposed to the Federal Reserve Act, by which the larger proportion of the savings deposits of national banks may be used for building purposes, is an advisable change. There is an ample margin for a great increase in this respect, leaving ample proportion of liquid funds.

There is another diversion of savings that I think is worthy of consideration, and that is in the Postal Savings System. In this system the deposits are so redeposited as to flow into commercial purposes. It would seem a constructive thing if 40% or 50% of deposits in postal savings banks could be diverted to home building as is the case in the savings banks. I am convinced that an extension of the postal savings activities would mobilize a considerable fund of hoarded money, and by action such as outlined above we should increase substantially the available sums for home building. Any such proposal can be surrounded with the necessary requirements of local application and perfect safety in investment by filtering the money through existing building institutions."

ADDITIONAL REPORTS CONFIRM PROSPECT OF BETTER BUSINESS OUTLOOK

Supplementing the special reports published in THE HEATING AND VENTILATING MAGAZINE for July, indicating a turn in the tide of business, the following additional reports are presented, which arrived too late for publication in last month's issue:

From the Abram Cox Stove Co., Philadelphia, Pa.: "It is a pleasure to answer your letter of June 29. '1921 is rewarding fighters' is indeed a truthful slogan. There is no doubt that business has been more difficult to secure, but the volume is increasing and there are several really bright spots on the horizon. All indications point to a steady improvement, and we are very optimistic about business for the remainder of the year."—Thomas I. Rankin, Advertising Manager.

From the American District Steam Co., North Tonawanda, N. Y.—"Replying to your letter of June 13th, regarding the general outlook, will say that from our standpoint we are rather optimistic—this for the reason that the major part of our business is done with public utility companies, and inasmuch as they have received through various public service commissions, increases in their heating rates, as well as gas, electricity, etc., the earnings of the heating department have shown up much better than in the past. At the present time we have on our books about the average amount of business for this time of the year and every indication seems to be that we will enjoy the usual amount during the remainder of the year.

"We have found it possible to reduce our selling prices somewhat, due, of course, to the reduction in the prices of raw materials and labor."—Robert Hall, vice-president and general manager.

From The Ric-Wil Co., Cleveland, O.—"Replying to your letter of the 13th inst., asking for our opinion of the general business outlook, we beg to advise that the immediate situation seems to indicate some progress toward betterment and we believe same will continue, but slowly."—C. Gottwald.

BUILDING COSTS IN 1921

Under this caption there appears in a recent issue of the *School Board Journal*, an analysis by W. Randolph Burgess, covering the period from 1913 to date. As might be expected, the article is directed particularly at school buildings, but it is fair to assume that the conclusions apply reasonably well to those of other types.

Mr. Burgess is optimistic with regard to the present trend of building costs and presents one diagram (Fig. 1) showing the relation between costs of materials, labor costs, and total building costs (plotted from data collected by the United States Bureau of Labor Statistics). This chart shows that, taking 1913 prices for a standard of comparison as 100%, material prices reached a maximum of about 320% early in 1920 while the maximum labor prices of 190% were reached in the same year. Taken along with his statement that about 60% of building costs are for material, it would seem that the stoppage of building constructon was not entirely due to the altitude of labor costs. The chart shows further that material costs were excessive at their maximum, by the fact that within less than a year they have dropped over 100% on the scale—that is over 35% from their 1920 maximum—until at present they stand about the same as labor costs at approximately 200% or double the 1913 standard with a downward tendency which can only be certified by future figures.

Of special interest to those in the Metropolitan District of New York is a tabulation (Table 1) made by Mr. Burgess, comparing costs of various general types of buildings in that district, between figures for 1921 and the maximum figures of the preceding year, with 1914 costs assumed as standard at 100%.

The elements of cost which combine to produce the total are treated separately in another table (Table 2) covering costs per cubic foot of school buildings constructed in Cleveland, O., 1913 to April, 1921, stated in percentages of the figures for 1913.

Summarizing the material presented in his article, Mr. Burgess closes with the following statements:

"In the light of these facts the writer inclines to the belief that the general level of building costs has not yet reached its lowest point. A statement which is true, however, of the average level of building costs may not be true of particular types of buildings or in particular localities. For the school board contemplating building there is no recourse but to watch building prices with the greatest care, to keep in touch with a thoroughly reliable architect, and to form its judgment in the light both of general price tendencies and the particular circumstances of its own situation. The school architect should be able to provide the board from month to month with diagrams and tables such as those accompanying this article, but applying to particular localities rather than the country as a whole. An index of the cost of building materials is given newspaper release about the 20th of each month by the United States Bureau of Labor Statistics. The same bureau publishes wage figures in its Monthly Labor Review. The American Contractor also quotes the wages of building artisans and laborers for a long list of cities each month. With figures such as these before it the school board is equipped to consider new building undertakings and to decide upon its course of action."

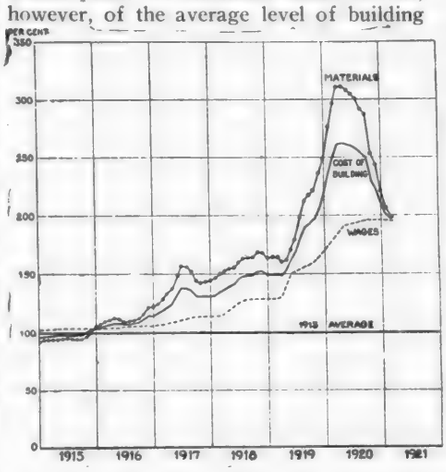


FIG. 1—DIAGRAM SHOWING RELATION OF MATERIAL AND LABOR COSTS ON BUILDINGS.

TABLE 1. CONSTRUCTION COSTS IN GREATER NEW YORK.

Type of Building	Highest Costs 1920 (1914 Costs 100 Per Cent)	April Costs 1921	Per cent. Decline 1920 High to April, 1921
High Class Elevator Apartment.....	275	210	24
Medium Class Non-elevator Apartment	230	180	22
Suburban Residence	375	275	27
High Class Office Building.....	225	170	24
Office and Loft Building.....	220	165	25
City Public School	350	285	19

TABLE 2—COST PER CUBIC FOOT OF SCHOOL BUILDINGS CONSTRUCTED IN CLEVELAND, O., 1913 TO APRIL, 1921, IN PERCENTAGES OF FIGURES FOR 1913.

Elements	1913	1914	1915	1916	1917	1918	1919	1920	1921
Masonry	100	99	107	136	166	184	238	281	246
Finish	100	107	151	237	258	307	387	730	307
Iron and steel	100	39	69	123	139	177	131	154	154
Plaster	100	73	82	91	100	127	173	400	182
Heating	100	76	92	144	196	292	468	468	272
Plumbing	100	133	144	222	289	467	567	711	300
Wiring	100	200	300	700	500	600	1000	750	850
Total	100	94	112	163	191	238	313	413	259

Heating Contractors' "Declaration of Principles" To Be Presented at Convention of Journeymen.

According to the report of the Conference Committee of the Heating and Piping Contractors' National Association, the "Declarations of Principles," adopted by the heating contractors last year at their Cleveland convention, will be formally presented to the United Association of Plumbers, Steam Fitters of the United States an dCnada, at its forthcoming convention in Providence, R. I., September 19. In connection with these "Principles" it was resolved at last year's convention "that this convention hereby go on record as favoring the appointment, by the President, of a Labor Conference Committee, whose duty it shall be to consider such labor problems, and confer with such representatives of our employees, as may from time to time desire to submit to this committee matters which may be of mutual interest, and may properly come before it for its consideration."

Several efforts were made by this committee, through its chairman, William H. Oakes, to meet with the Labor Committee of the United Association of Plumbers and Steam Fitters. This meeting, however, had not been possible due to the fact that the journeymen's committee had had no opportunity of presenting to their convention the "Declaration of Principles," adopted by the master steam fitters.

Further Data on Proposed Central Water Service Heatings Systems for English Housing Projects.

Further data received on the proposal to establish central hot water supply systems on an extensive scale in England contain some interesting details of the scheme. In the case of the Blackley Estate, in the city of Manchester, England, the proposal is for the establishment of a central station to supply 1000 houses. Water will be heated in boilers to about 150° F. and distributed through well-lagged mains laid in concrete ducts to the houses on this estate. The water will be connected to the kitchen by a spring tap, and thence on to the bath. In this way a constant supply of hot water will be available to the housewife at all times.

No kitchen range will be provided but there will be a gas cooker and a gas "copper" in the scullery. An open fire in

the living room will be depended upon for house warming purposes.

It is estimated, on the basis of accepted tenders, that the cost of the proposed installation will not exceed the saving by the omission of the ordinary apparatus—that is, kitchen range, back boiler, cylinder, cisterns, plumbers' work and joiners' work—so that no extra capital expenditure will be incurred. It is estimated further that the cost of upkeep and management of the central plant, including labor, fuel, etc., will be from 9d to 1s. per week per house, on a basis of 25 gal. of hot water supplied to each house for the 24 hours. It is proposed that this should be met by a charge on the rent which would, in the first instance, probably be fixed at, say, 1s. 3d. per week. Twenty-five gallons of water per day at 150° F. will provide 50 gal. of water at the temperature required for a hot bath.

As against the charge of 1s. 3d. per week on the rent for the supply of hot water, there will, of course, be a corresponding saving of fuel per house.

In the case of the Gordon Estate, in the same city, where a similar scheme is proposed to take care of 600 houses, the proposal is to utilize the present destructor works (which are adjacent to this estate) and by the provision of boilers, etc., in lieu of the present destructors, to use the steam raised from the burning of the town refuse to heat the water for the houses to be built on the estate.

It is estimated that the cost of upkeep and management of this central plant, including labor, fuel, etc., will be about 8¼ d. per house per week, and it is proposed that this should be met by a charge on the rent of 1s per week per house.

Midwest Heating & Ventilating Co., Rockford, Ill., has been organized by E. D. Bentz, C. B. Joyce and R. E. Loedberg. The new company has taken quarters at 158 Morgan Street and is equipped to install heating and ventilating systems, blowpipe work, smokestacks, tanks, furnaces and sheet metal work. Mr. Bentz has had 23 years' experience in the sheet metal trade. For seven years he was superintendent of erection for the New York Blower Company and for the past eight years has been general superintendent for the Narowetz Heating & Ventilating Co.

D. E. Sexton, Carlinville, Ill., heating and ventilating new Community high school building for $33,932. The contract was originally awarded to the Bergner Heating & Plumbing Co., of Granite City which signed a release, due to labor troubles.

W. J. Scholl Co., Youngstown, O., heating and ventilating new Rayen School in Youngstown for $122,469. The plumbing contract went to the W. G. Cornell Co., (Cleveland office) at its bid of $51,400.

ELIMINATION OF WASTE IN THE BUILDING INDUSTRY

In the *Journal* of the Engineers' Club of Philadelphia for June appears an article by D. Knickerbacker Boyd in which are presented suggestions for a reduction of some of the avoidable wastes incidental to the building industry. The article mentions a number of ways in which coöperation would be blessed by resulting economy and gives in particular some very interesting data on lost-time in the building trades, from figures collected by men in these trades.

Some of the points in which economies can be effected, according to Mr. Boyd, are: standardization of many building parts such as doors, windows and similar features common to all buildings; particular care in every building design to prevent the spread of fire to and within the building; the use of quantity surveys as a basis for estimating (to prevent waste of a duplicate checking of plans by each bidder) and the initiation of a fee for estimating; and the scheduling of work so as to eliminate periods of excessive activity followed by periods of stagnation such as seasonal weather variations now foster.

The most interesting part of the article is that referring to unemployment, which is characterized as the greatest waste of all. In this connection there is presented a diagrammatic chart showing the relations between avoidable time loss, time utilization, and the time losses due to Sundays and holidays which are unavoidable. This chart is reproduced in Table 1. The causes assigned as responsible for this waste are weather conditions, seasonal demands, poor planning of work, materials

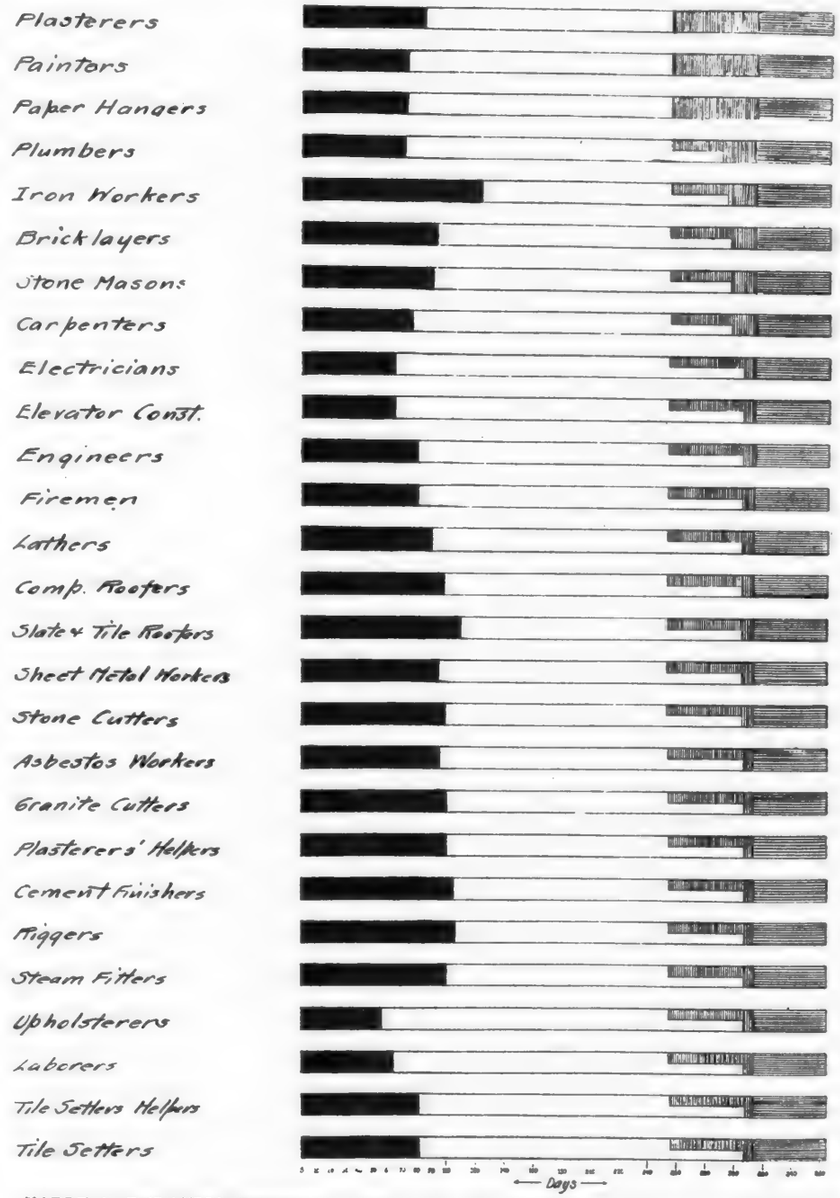
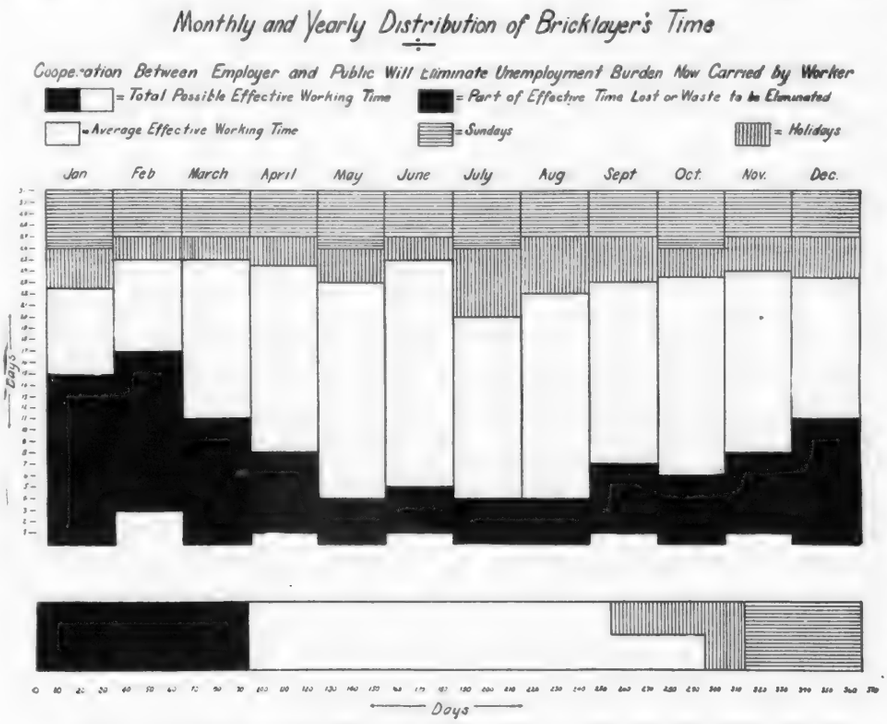


TABLE 1—RELATION BETWEEN TIME LOST, TIME USED, AND HOLIDAYS IN THE BUILDING TRADES. (See Table 2 for key.)

not on hand, failure of other work to maintain its schedule, lost time in looking for work and in strikes. Referring to the matter of over-time, which is a method used to counteract the effect of delays, it is stated that one reason why labor has exacted very high rates for over-time is because it has desired to make the penalty so severe as to discourage the use of over-time.

The seasonal variation in waste time is brought out by considering for a single trade—the brick-layers, in this case—the monthly relation between lost, used, and holiday times. Figure 2 shows this variation most strikingly. The remedy suggested is a postponement during good weather of every kind of indoor bricklaying that can be delayed, and the handling of this work during periods of bad weather when men would otherwise be idle. Another suggestion regarding the seasonal trades is that each man learn two trades, so that during the dull season in one he can shift to the other. This is already done by a few men with just the result suggested and with the additional result of a considerable increase of independence in the man which may prove an occasional source of annoyance to the old school employer, but is a healthy condition for the man and the community.



TABL 2—SEASONAL VARIATION IN TIME LOST IN THE BRICKLAYING TRADE.

Handbook on Central Station Heating Almost Ready.

Announcement is made that the new handbook of the National District Heating Association, which will be devoted to date on central station heating, is almost ready for distribution. The handbook is now in the hands of the publishers, the Lefax Co., of Philadelphia, the association having closed a contract for its publication by this firm on very favorable terms.

The handbook will be of the loose-leaf type and will contain from 150 to 175 pages of technical data. It will also contain a large number of manufacturers' pages containing technical data on various kinds of apparatus and equipment used in the district heating industry. These manufacturers' sheets will be scattered through the book in appropriate sections and will contain engineering information, rather than display advertising.

The following firms have taken space in the handbook and many more concerns are expected to be represented: American District Steam Company, Central Station Steam Co., H. W. Johns-Manville Co., General Electric Co., Republic Meter Co., J. C. Hornung, A. M. Byers Co., Pittsburgh Piping & Equipment Co., Ruggles-Klengeman Co., James A. Brady Foundry Co., Briston Co., Illinois Engineering Co., and the Ric-Wil Co.

Heating as a Distinct and Separate Business.

A significant characterization of the heating industry as "a separate and distinct business" is contained in the report of the Secretaries' Association of the Heating and Piping Contractors' National Association where it is stated, under "Suggestions for Increasing Membership in the National Association."

"All trade periodicals are desirous of securing information or news. If heating was specifically separated from plumbing as regards our activities and so impressed upon the publishers as a separate and distinct business, conducted by a great number of our membership as such, I think it would impress many who now conduct combination shops, with the advisability of joining, when now they believe it ample to belong to only the Plumbers' Association."

Trade Paper Representatives Know Their Fields.

A well-merited appreciation of the importance of the trade paper representative as an observer of trade conditions and of important movements in the industry, is expressed by H. L. Delander, advertising manager for Crane Co., Chicago, writing in *Class* for July.

"I have never sold a thing in my life—that is to say, I have never been employed as a salesman," writes Mr. Delander, "but I have bought hundreds of thousands of dollars' worth of advertising. I have met thousands of representatives of business publications, general magazines, farm papers, newspapers, outdoor, direct-by-mail and novelty advertising, service agencies, etc.

"I try to get some information from every man who calls on me, for it is obvious, it seems to me, that a man who represents a publication in a particular field should know more about that field than an advertising manager whose interest is divided among many different fields. It doesn't always follow that that is true, but it should be to a large degree. I am frank to admit that some of my knowledge of publications and their functions in their various fields has been gained by talking with representatives of those publications.

"The representatives of our leading publications today are, as a class, high-grade, responsible, serious-minded individuals. They know their papers and the fields they serve. And the advertising manager who fails to appreciate and avail himself of the experience and knowledge of the solicitor is deceiving nobody but himself."

Healy Heating & Plumbing Co., St. Paul, Minn., heating and ventilating and plumbing new county court house building in St. Cloud, Minn., for $53,800. The Healy company made a deduction of $5,200 if it should be awarded the entire job. This placed the company $3,667 under its nearest competitor. The new bid submitted by the Healy company represents a saving of $1,534 as compared with the bid made by the same company March 17. Other bidders were: Benson and Bretz, St. Cloud, $39,000.00; J. P. Bisenius, St. Cloud, $38,700.00; American Heating Co., Duluth, $36,483.00; Harris Bros., Minneapolis, $39,900.00; Frank Eha, St. Paul, $37,894.00; Hankee Heating Co., St. Paul, $35,755.00; J. E. G. Robb & Co., Minneapolis, $35,985.00.

Contracts Awarded.

Lee McDonough, Waukegan, Ill., heating and ventilating new township high school in Waukegan, for $37,500. Other bids were: Phillips Getschow, $46,500; Kohlbry Co., $47,500; Noble-Thumb Co., $39,350; Claffey & Co., $42,864. The plumbing contract went to Thomas Killian at his bid of $10,715. The Pacific type of boiler was specified.

CHICAGO, ILL.—Building permits amounting in value to $14,004,650 were issued in Chicago in July, as against $6,669,300 a year ago.

HUMIDIFYING DEVICES FOR THE HOME

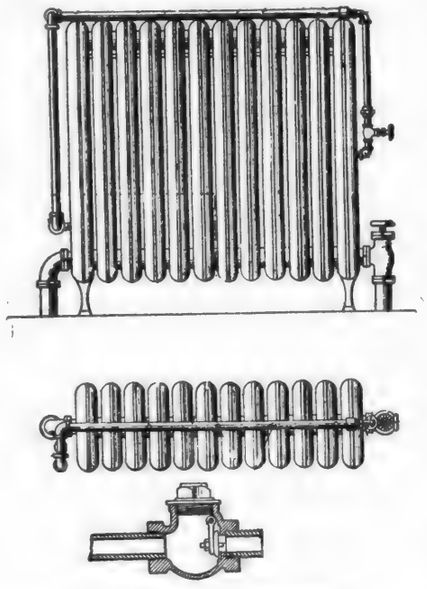
No. 7—Speco Air Moistener

Assuming a position, at once unobtrusive and strategic, the Speco Air Moistener attacks the humidification problem at the point of greatest heat—between the radiator and the wall and near the top of the radiator. To occupy this scant space calls for a thin build, but to make up for this characteristic the device is made both long and deep. The material of the outer case is heavy galvanized sheet steel and this case is supported in place by two curved arms which are pivoted at its ends and drawn up over the radiator sections. Another wire, fixed inside the case and extending up above its top, serves as a handle by which to raise the apparatus for inspection or refilling. The wick in this humidifier extends well above the top of the case and thereby adds to the exposed liquid surface. The Specialty Manufacturing Company, of St. Paul, Minn., makers of the device, suggest that it can also be used for disinfecting purposes.

SPECO AIR MOISTENER.

No. 9—Monahan Humidifier.

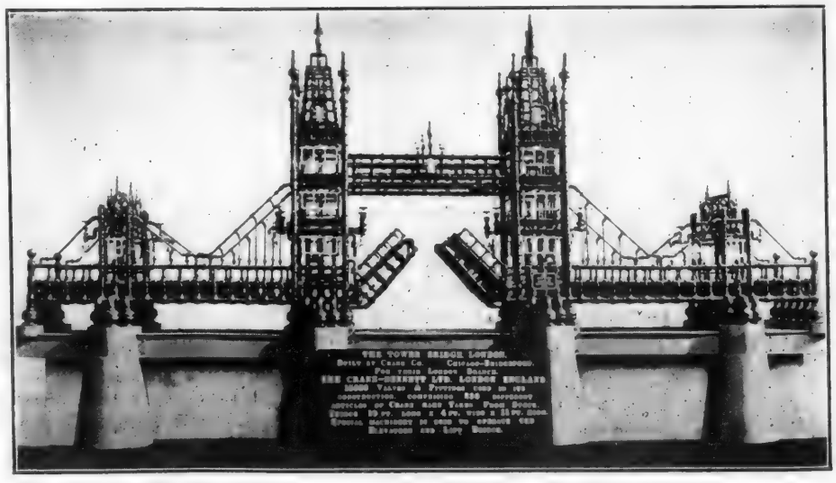
Scorning water pans and wicks and the whole evaporation theory the humidifying device patented by M. C. Monahan, Dixon, Ill., goes at its problem directly, by equipping the steam radiator with an auxiliary circuit through which steam can be drawn from the radiator and released to the air. The arrangement is quite simple. A line is tapped into the inlet end of the radiator and a globe valve inserted in the vertical riser for the purpose of regulating the supply of steam drawn from the radiator for humidifying use. This vertical riser connects at the top with a pipe of larger size running along the top of the radiator from inlet to return ends. Performations in this pipe serve as the means of exit for steam from the radiator to the room. The other end of this pipe connects with a vertical riser at the lower end of which is placed a swing check valve that permits the return of condensation to the radiator but prevents the entry of steam from the return end of the radiator to the humidifying device. Evidently the device would not operate satisfactorily on a vacuum system and on a pressure system a slight rise in pressure might result in excessive humidification unless care was taken to adjust the control valve for it.



MONAHAN HUMIDIFIER.

Crane Fittings Assembled in Bridge Form.

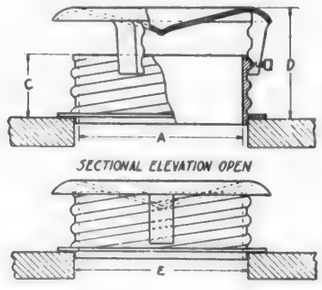
A working model of the Tower Bridge, London, England, was recently constructed at the Bridgeport Works of the Crane Company and presented to the London office as a mascot. The model measures 19 ft. in length by 4 ft. in width by 11 ft. in height and contains 15,358 pieces taken from regular stock representing 230 different kinds of fittings. The engineering and plumbing features presented in the erection of a bridge of this character are such as to interest anyone with a truly mechanical turn of mind.



CRANE-BUILT MINIATURE OF TOWER BRIDGE, LONDON.

Trade Literature.

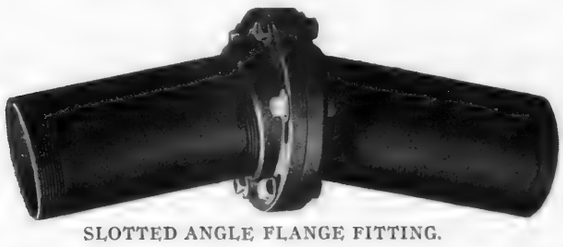
LYON TOADSTOOL VENT CAP manufactured by the Mellish-Hayward Co., Chicago, Ill., is brought to public attention in a recent pamphlet of that company. The principal claim to merit in this device is based upon the fact that the throat of the ventilator is without obstruction, adjustment of the cap piece being secured by means of a thread about the outer periphery of the throat section, which is engaged by the lower ends of the three lugs which support the cap. One complete revolution of the cap is sufficient to cover all the possible adjustments between closed and full open. The table of sizes given in this catalog is made more convenient by using the inside diameters of the throat in inches to designate the several sizes. Pamphlet size 4 x 7 in. Pp. 8.



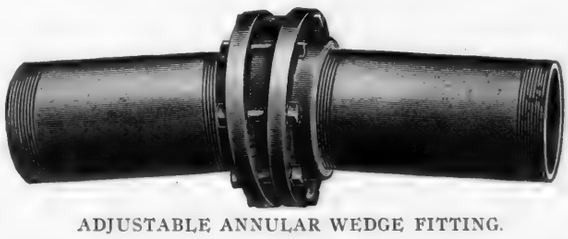
LYON TOADSTOOL VENT CAP

ADSCO ANGLE FITTINGS are described and illustrated in Bulletin 153 of the American District Steam Co., North Tonawanda, N. Y. The first of these fittings treated is the adjustable annular wedge which is used in connection with straight flanges for securing an offset in a line of pipe. A tongue and groove joint between the two sections of the wedge permits their rotation to secure the desired

angle of offset up to about ten degrees maximum. The wedge is retained in place by the shanks of the flange bolts. Another means for getting a similar effect is offered in the slotted angle flange which is capable of six adjustments from minimum to maximum angle of offset. This



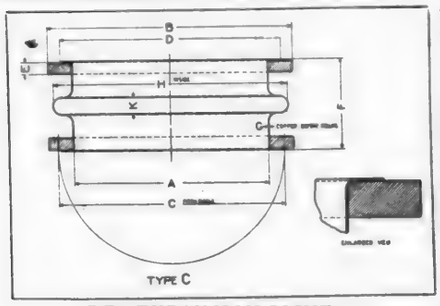
SLOTTED ANGLE FLANGE FITTING.



ADJUSTABLE ANNULAR WEDGE FITTING.

adjustment is secured by changing the relative positions of the bolt holes in the two parts of the flange. Tables of sizes, weights, and prices on these angular fittings are included in the bulletin. Size 6 x 9 in. Pp. 8.

G-R Expansion Joint, Type C, for low pressure lines is shown on a leaflet issued by the Griscom-Russell Co., New York. The compression guarantees under which this device is sold are: first, to compress ¼ in. axially when subject to a compressive force of 125 lbs. per inch nominal diameter of pipe; and second, to



G-R—EXPANSION JOINT.

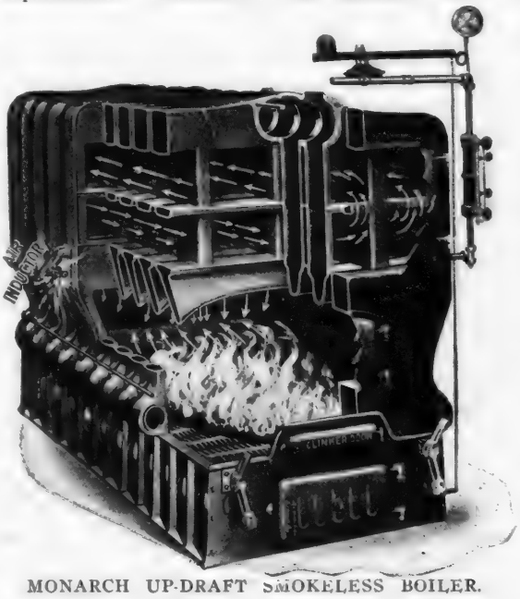
distort laterally ⅛ in. with the same force. The range of pressures for which it is designed are 20 lbs. per sq. in. to a vacuum of 29½ in. mercury. A table of standard sizes and dimensions is given. Size 8½ x 11 in. Single page.

Valve World, the monthly house organ of the Crane Co., Chicago, devotes considerable space in its July issue to the recent convention of veteran Crane employees and branch house managers held at Crane headquarters. The veteran league is composed of Crane employees who have served for 25 years or more with the organization, and this distinction entitles the employee to wear a gold badge showing a bust of the company's founder. The branch managers' convention is a get-together for combined purposes of business and pleasure and included this year a considerable delegation of managers' wives.

Stratton Steam Separator, made by the Griscom-Russell Co., New York, finds detailed mention in Bulletin 1140 of that concern. This apparatus is manufactured in both vertical and horizontal designs and in its separation of steam and water is effected by combination of a spiral deflector and radial baffle plates. The water is drawn off at the bottom while the steam outlet is at the top of the cylinder. Along with tables of dimensions there are given diagrams of typical installations which add to the value of the pamphlet. Size 6 x 9 in. Pp. 16, punched for binding.

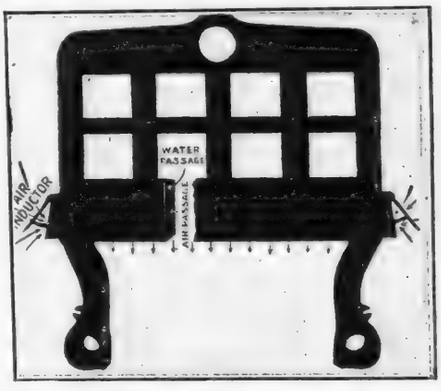
Temperature Regulator Chart is a first-aid to designers in the form of a graphic means for determining required sizes of temperature regulators to meet certain combinations of steam pressure, quantity of water heated, and temperature rise of water. This chart consists of five vertical scales, including one reference line and the calculations which are, of course, only approximations, are obtained by two ruler settings for each computation. The accuracy of the method is ample for its purpose and the saving of time is considerable. Full directions for its use accompany the chart and on the reverse side of the leaflet are given sample specifications on Fulton specialties. Size 8½ x 11 in. Single page.

Monarch Up-Draft Smokeless Boiler is announced by the Wm. H. Page Boiler Co., New York, in its latest circular to the trade. Following closely the lines of the preceding Monarch design, this boiler features as an air inductor section through which is introduced an auxiliary air supply that enters the combustion chamber close to the bridge wall and serves to supply the oxygen required for complete combustion. The air passage through this inductor section is jacketed by water passages so that it can not burn out. Another feature of this design is the arrangement of adjustable air dampers at each end of the inductor section so that the quantity of excess air can be varied to meet operating requirements. Elevation of the inductor section and sectional view of the boiler in operation are included in the pamphlet and serve to show a return to the single grate, up-draft type. Size 8 x 11 in. Pp. 4.



MONARCH UP-DRAFT SMOKELESS BOILER.

Sylphon Specialties are brought to the attention of the trade in a series of small folders recently put out by the Fulton Co., Knoxville, Tenn. One of these folders is devoted to the packless radiator valve which it shows in section, with accompanying description of construction and operation details. Temperature regulators are



INDUCTOR SECTION IN MONARCH UP-DRAFT BOILER.

the topic in the other two folders, one of which deals with construction and the other with operating features. The sizes and prices are also given in tabular form in these booklets. Size 3½ x 6 in. Pp. 4.

Peerless Patented Boilers of the single grate, up-draft, smokeless type are mentioned favorably in the 1921 catalog of the Peerless Heater Co., Pittsburgh, Pa. In common with other boilers operating on this principle, the Peerless relies upon the draft through the boiler to suck in a supply of auxiliary air as an aid to complete combustion. With this boiler, however, the air is drawn up into the gas path at the bridgewall from an air chamber in the base of the boiler. This design represents a departure from the downdraft principle upon which this concern has previously concentrated in the construction of smokeless boilers. Size 5½ x 8½ in. Pp. 6.

Carrier Air Washers and Humidifiers are advocated in a pretentious catalog of the Carrier Air Conditioning Company of America, Buffalo, N. Y. The text portion of the book opens with a technical discussion of air washing and humidification principles, with which are given two comprehensive humidity charts

Following this comes note on the main applications of Carrier equipment and the succeeding material covers design features and principles of this apparatus. The book is profusely illustrated with views of buildings in which this equipment has been installed and with sectional views of the assembly and of various parts, also layouts and piping diagrams. The usual tabular matter on sizes and capacities is reserved until its conventional position is reached at the end of the pamphlet. Size 8½ x 11 in. Pp. 56.

New Plant of the Dole Valve Company.

The Dole Valve Company of Chicago, Ill., recently moved its plant from its old quarters on North Wells Street to a modern structure at 1923-1933 Carroll Avenue shown in the accompanying illustration. The new plant is a two-story building except the office portion in front which is three stories in height. It covers an area of 125 by 125 feet and contains not only an extensive foundry equipment but also both light and heavy manufacturing machinery required in the production of Dole specialties. The officers of the company are: Andrew R. Dole, president; Arthur Dole, vice-president; John L. Dole, secretary; and F. H. Tweed, treasurer and manager.

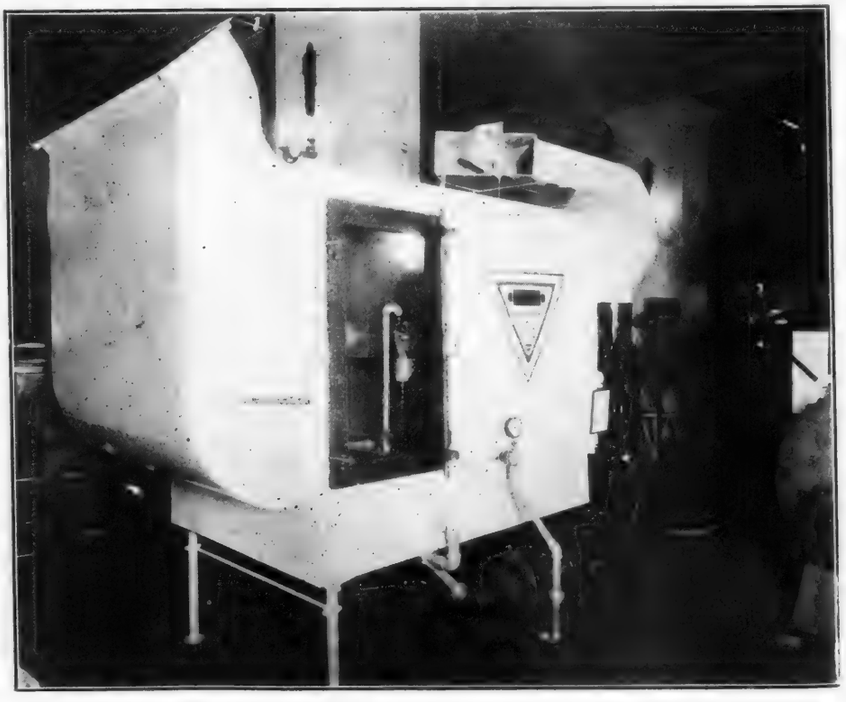
NEW PLANT OF THE DOLE VALVE COMPANY.

Lynn Air Washer Cooling Test.

During the recent Ventilation Show in New York, held under the auspices of the New York Edison Company, an interesting air-cooling test was conducted on a Lynn air washer which was being exhibited at the show by the Lynn Air Conditioning Co., of New York. The test was made at 3 p. m., June 24, under the direction of L. Helmer, engineer for the company. The temperature in the exhibition hall at the time was 87° F. dry-bulb and 70° F. wet-bulb, or 17° difference. Water from the house service lines was used in the washer, this water having been recirculated for six hours previous to the test.

Readings were taken of the air temperature leaving the washer, the figures being 70° F. dry-bulb and 70° F. wet-bulb, or 25.3° F. cooling effect, giving an efficiency of 90%.

A supplementary air-cleansing test was made with the same outfit. Ten pounds of screened dry dust was thrown into the air inlet of the washer. A cheese-cloth screen placed across the outlet duct showed no dust at that point.



LYNN AIR WASHER TEST INSTALLATION.

Deaths.

FRANCIS B. CROCKER, a well-known electrical engineer, one of the founders of the C. & C. Co., and the Crocker-Wheeler Co., died July 9, in New York. He was 60 years old. Professor Crocker was the founder and head of the School of Electrical Engineering at Columbia University, having held this positon for the past 20 years. To Professor Crocker is given the credit for developing the electric motor into a commercially practical device.

D. C. MURPHY, one of the pioneer branch sales office managers for the C. A. Dunham Co., Chicago, Ill., and at the time of his death manager of the Davenport, Ia., office, died at his home in Davenport, Ia., June 13, of heart failure. Fifteen years ago Mr. Murphy began to handle the Dunham specialties in eastern Iowa and western Illinois. One of the first Dunham installations in his territory was in the Immaculate Conception Academy, in Davenport, consisting of about 150 traps. Two additions have been made to the academy, requiring the installation of 150 more traps. The original plant is still in operation. It is proposed to carry on the business of this branch with the organization built up by "Dan," as Mr. Murphy was known throughout his territory.

CHARLES P. BERRY, secretary-treasurer and general manager of the Oil City Boiler Works, Oil City, Pa., died July 5 in the Memorial Hospital at Norwalk, O., as the result of an automobile accident on the Fourth of July. Mr. Berry and a Cleveland banker, J. L. Quigley, were returning from Findlay to Oil City when the accident happened. It is supposed that the steering gear of the car in which they were riding got out of order, causing the machine to skid and turn turtle just south of Monroeville. Both of the occupants of the car sustained fractures of the skull.

Mr. Berry was a native of Oil City where he had lived all his life. He was about 45 years old. He was formerly connected with the Oil City Trust Company as paying teller, resigning about six years ago to take the position with the Oil City Boiler Works which he held at the time of his death. He leaves a widow and two sons.

Quantity Surveys and Payment for Estimating.

Supplementing material on the same subject presented in the July number of HEATING AND VENTILATING MAGAZINE, which had only the weight of tentative suggestion at that time, the following recommended procedure for architects, engineers, builders (that is, contractors and sub-contractors), and owners is now given as finally approved and adopted by the Associated General Contractors of America, the American Engineering Council of the Federated American Engineering Societies, and the American Institute of Architects.

In many homes, particularly town houses or apartments, the space for the heating boiler is very small and frequently adjoins the entrance hall. The IDEAL Type "A" Heat Machine is admirably designed for plans of this character

Economy of Fuel and Space

"It burned 40% LESS COAL this year."—This statement from a grateful owner exceeds the tabulated results from hundreds of installations of IDEAL Type "A" Heat Machines—which average **A FUEL SAVING OF ONE-THIRD.** Besides this fuel economy, this reduced amount of coal requires one-third less storage space, and caretaking.

The **Large Fuel Chamber** holds enough coal to run without attention from 8 to 24 hours, depending upon weather demands.

The **Revertible Flues** and scientifically proportioned surfaces absorb and utilize the heat, preventing its waste up the chimney.

The **Automatic Regulation** prevents waste of heat by controlling the fire to supply the exact volume of heat needed—avoiding *under*-heating and *over*-heating..

The **Ideal Insulated Jacket,** dust-free and gas-tight, permits converting the basement into livable, recreational quarters.

We offer testimonial letters from many prominent users. Specify and use IDEAL Type "A" HEAT MACHINES for NEW or OLD residences.

Write for catalog containing test charts of FUEL ECONOMY and efficiency.

IDEAL Type "A" Heat Machine

IDEAL products are nationally priced and sold by all heating contractors. No exclusive Agents.

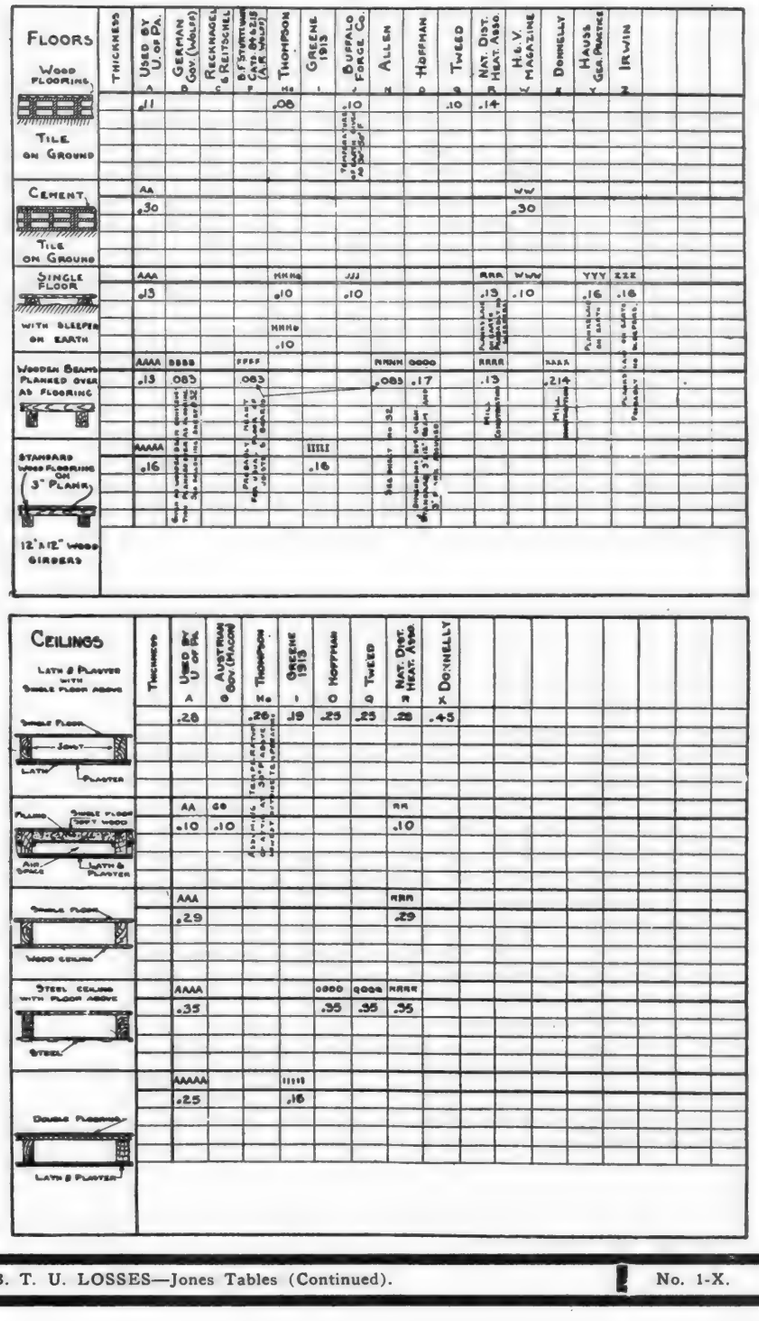
AMERICAN RADIATOR COMPANY

Sales Branches in All Large cities

Makers of the world-famous IDEAL Boilers *and* AMERICAN Radiators

THE HEATING AND VENTILATING MAGAZINE—1123 BROADWAY, N. Y. CITY

HEAT LOSS TABLES



B. T. U. LOSSES—Jones Tables (Continued). No. 1-X.

THE HEATING AND VENTILATING MAGAZINE—1123 BROADWAY, N. Y. CITY

HEAT LOSS TABLES

CEILINGS

	THICKNESS	Used by U of Pa A	German Gov (Wolff) B	D. F. Sturtevant Co's 8th Ed. (A.R. Wolff) F	Austrian Gov (Macon) G	Thompson H	Greene I	Allen N	Hoffman O	Tweed P	Nat. Dist. Heat Asso R	Practical Eng. S
Double Flooring on Sleepers — Reinforced Concrete		.24			.24						.24	
Double Flooring on Sleepers — Plaster on Expanded Metal Reinforced Concrete		AA		FF	GG		II				RR	
	With Airspace	.19		1.45	.187		.15				.19	
	Unit											
Double Flooring — Tile or Concrete Filling — Plaster on Expanded Metal — Reinforced Concrete	"T"	AAA			GGG						RRR	
	6"	.16			.16						.16	
	7"	.14			.14							
	8"	.12			.12						.12	
	9"	.11			.11							
	10"	.10			.10						.10	
	12"	.09			.09							
	15"	.08			.08						.08	
	20"	.07			.07							
Glass — Iron or Cement Vault Light		AAAA		FFFF							RRRR	SSSS
		1.43		1.43							1.46 Gluck & Sukenick	1.4

CEILINGS

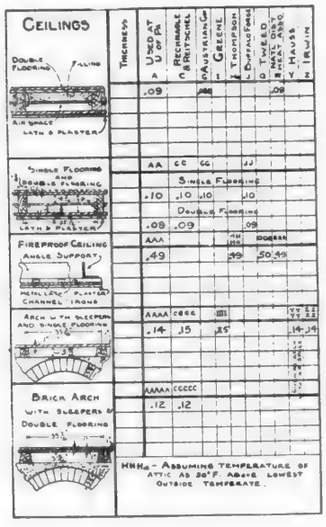
	Thickness	Used by U of Pa P	German Gov (Wolff) D	Hoskins B	D. F. Sturtevant Co's 8th Ed. (Wolff) F	Thompson H	Greene 1915 I	Snow K	Allen N	Hoffman O	Tweed P	Nat. Dist. Heat Asso. R	Aetna Fire Ins. Co. T	E. Kidder Magazine U	Haus's Gas Practice V	Austrian Gov (Macon) G	Donnelly X	Irwin W
Wooden Beams Planked over as Ceiling		.30	.104		.104				.104	.35								
Mill Construction		AA					II										XX	
		.19					.10					.19					.214	
Double Floor Above No Plaster Below		AAA	BBB		FFF		III					RRR	MMM		YYY	GGG		ZZZ
		.40	.104		.104		.33					.40	.104		.10	.33		.10
Double Flooring		AAAA					IIII											
		.23					.23											
Lath & Plaster No Floor Above		AAAA			BBBB			CCCC		DDDD	EEEE	FFFF					GGGG	
		.45	.62		.52			.237		.62	.50	.49		.62			.60	

1 - Buffalo Forge Co. made no distinction between floors and ceilings — See Floor

B. T. U. LOSSES—Jones Tables (Continued). No. 1-Y.

THE HEATING AND VENTILATING MAGAZINE—1123 BROADWAY, N. Y. CITY

HEAT LOSS TABLES



Thickness	Used by U of Pa A	Recommended by B Reitschel	C Austrian Gov	D Greene	E Thompson	F Dowling	G Wheeler	H Haus	I Irwin
	.09		.08					.08	
	AA	CC	CC		JJ				
	Single Flooring								
	.10	.10	.10		.10				
	Double Flooring								
	.08	.09			.08				
	AAA							BOEREN	
	.49				.49			.50 .49	
	AAAA	CCCC							
	.14	.15			.25				.14 .14
	AAAA	CCCCC							
	.12	.12							

KH K$_a$ – Assuming temperature of attic as 20° F. above lowest outside temperature.

EXPOSURE CONSTANTS

		Used by U of Pa	A German Gov Buff Forge	B Kinealy	C Austrian Gov (Macon)	I Thompson	K Greene	L Hubbard	M Allen	N Hoffman	O Hoffman Ger Gov	Recknagle Reitschel	Klinger	P Harding	Amer. Rad. Co.	X Donnelly	Y Hauss	
1	North	.40	.10		.20	.25	.15	.32	.10	.10-.20	.15-.25	.25	.10	.15-.30	.10	.10	.10	
2	East	.10-.20			.15	.10	.10	.12		.05-.10	.10-.15		.10	.10-.20			.10	
3	South	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
4	West	.20-.30			.15	.15	.10	.20		.05-.10	.10-.16			.10-.20			.10	
5	Northeast	.20-.30						.22		.10-.20	.15-.25	.25	.10	.15-.30			.10	
6	Northwest	.40						.26		.10-.20	.15-.25	.25	.10	.15-.30			.10	
7	Southeast	—						.06										
8	Southwest	—						.10										
9	North, East South, West	—						.16										
10	Heated Intermittently	.50	.30				.50		.40-.50	.20-.40	.50			.30				
11	Daytime Only Unexposed	.10	.10	.10			.10		.10		.10			.10				
12	Daytime Only Exposed	.30	.30	.30			.30				.30	.20		.20				
13	Exposed to Heavy Winds	—					.15		.30		.10-.20	.20-.30	.10		.10	.05		
14	12 to 14½ High	See Formula		.03							.03							
15	Above 15 High											.10				.033		
16	14½ to 18 High			.065							.06					.066		
17	Above 18 High			.10							.10					.10		
18	Corner Walls	—		.05			.10						.20					
19	Air Leakage	—			.10													

COVERED IN SELECTING OTHER EXPOSURE CONSTANTS

14-D —— 13 TO 14½ HIGH
10-I —— AT LONG INTERVALS.
11-I-11-Ob—DAYTIME ONLY - CLOSED AT NIGHT
12-I-12-Ob—DAYTIME ONLY - OPEN AT NIGHT
11-N —— DAYTIME ONLY ALLOWED TO COOL AT NIGHT
13-N —— NORTHERN EXPOSURE
1-5-6-Ob—ROOMS HEAVILY EXPOSED
16Y —— ABOVE 15' HIGH

AMOUNTS TABULATED ABOVE ARE PERCENTAGES TO BE ADDED TO HEAT LOSS FOR NORMAL SOUTHERN EXPOSURE
HIGHER AND LOWER FIGURES FOR MAXIMUM & MINIMUM EXPOSURES

$t' = t + 0.03\,(h - 10)\,t$

$t_1 = \frac{t' + t}{2} = t + 0.015\,(h - 10)\,t$

t' is temperature of air at ceiling
t_1 is mean temperature
t is temperature at floor
h is ceiling height
t should not be greater than 15°

B. T. U. LOSSES—Jones Tables (Continued). No. 1-Z.

THE HEATING AND VENTILATING MAGAZINE—1123 BROADWAY, N. Y. CITY

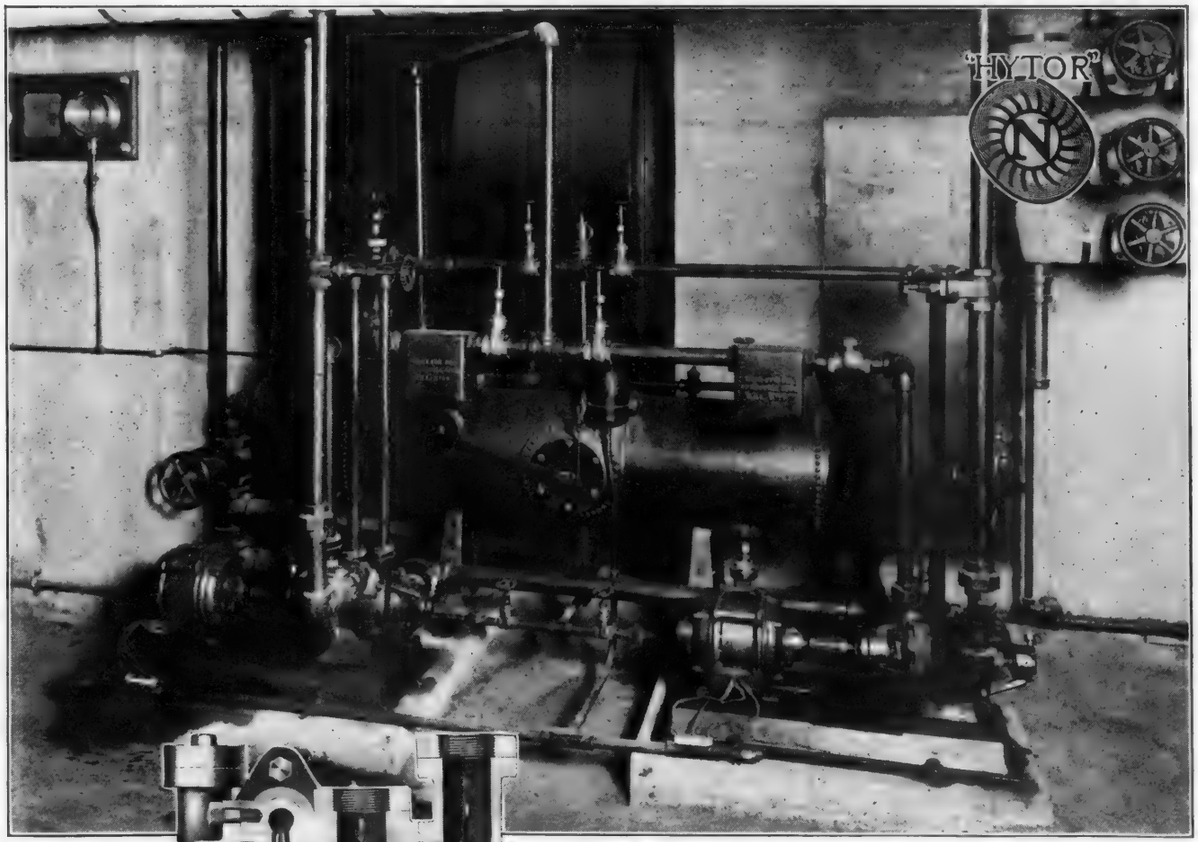
HEAT LOSS TABLES

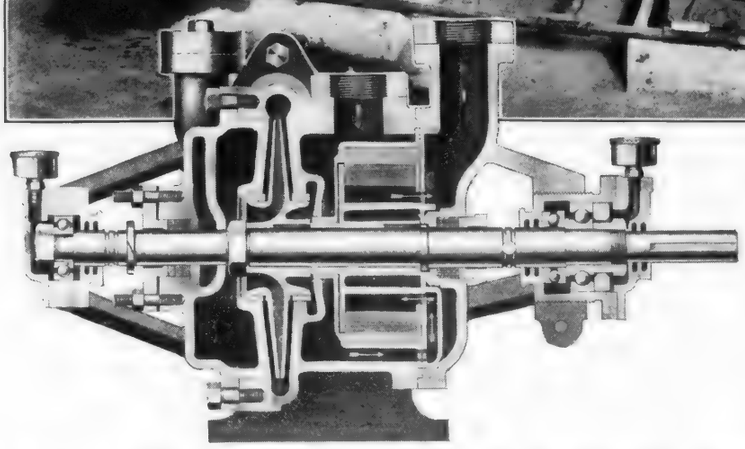
ROOFS	THICKNESS	Used by U of Pa A	Austrian Gov (Macon) G	Thompson H	Greene (1913) I	Buffalo Forge Co J	Hubbard L	Harrison M	Tweed O	Nat'l Dist Htg Assn R	Pract Eng S	Amer Rad Co T	Donnelly X	H & V Magazine W
Shingles / Shingle Lath		.63			.42					58	.90			
Shingles / Sheathing / Sliding		AA .32			II .31					RR .34			ZX .296	
Tar-Paper / 1" Boards		AAA .44	GGG .436							RRR .44				
Patent Roof: Tar and Gravel / Tar Paper / 1" Wood Sheathing or T & G Boards	1" Boards	AAAA .30	GGGG	HHHH .30		JJJJ .30		MMMM .27		RRRR .30		TTTT .30	SSSS .286	WWWW .30
	2" Boards Tar & Gravel	.26				.26		Gillis Mineral Roofing		.26		Gillis Mineral Composition Roofing		
		.21											.21	
Gravel / Tar / 8" Concrete / 6" or 8" Hollow Tile		AAAA		HHHH		JJJJ	LLLL			RRRR				WWWW
	8"	.38		.40		.35	.36			.40				.36
	10"	.36		.36						.35				
	8" Tile Ceiling	.40					.40							.40

ROOFS	THICKNESS	Used by U of Pa A	German Gov (Wolff) B	Peclet Carpenter E	Austrian Gov (Macon) G	Thompson I	Greene -	Buffalo Forge Co J	Hubbard L	Harrison M	Tweed O	Nat Dist Htg Assn R	Pract Eng S	American Rad Co T	Harding P	Irwin Z
Concrete / Reinforcing / Greene Beams		.50														
Cement Concrete / I Beams / Reinforcing		AA .50			GG .57		II .42				QQ .43	RR .57				
Asphalt / Tar, Pitch & Felt Layers / I Beams / Concrete / Reinforcing		AAA .38								MMM .27					PPP .60	ZZZ .27
Asphalt & Gravel Covering / Reinforcing / Concrete / I Beam Air Space / Metal Lath and Plaster		AAAA .20			GGGG .20							RRRR .20				
Cement Concrete / Reinforcing / I Beams / Metal Lath & Plaster Ceiling hung from Beams.		AAAAA .22					IIIII .22									

B. T. U. LOSSES—Jones Tables (Continued). No. 1-ZZ.

EFFICIENT HEATING *demands the* JENNINGS PUMP





Duplex C Unit, Automatic Operation

Wolf & Dessaner Dept. Store
Fort Wayne, Ind.

Capacity of each pump 26,000 sq. ft. direct radiation; air capacity 19 cubic feet per minute in addition to a water capacity of 35 gallons per minute.

The motors are only two horse power.

THE Jennings Pump consists of two independent turbine units, an air pump and a water pump. As each material is handled separately, the boiler pressure is against the water only. The air and vapor, approximately four-fifths of the volume handled, are delivered to atmosphere without back pressure. The saving in horsepower is over fifty per cent. In other words, the cost of current to operate is cut in half.

Because of its compact design, this equipment can be installed in less than one-third the space necessary with other apparatus. All interior parts are bronze, supported on annular ball bearings mounted outside of casing. Moving parts revolve without contact.

A quiet, reliable operation with minimum expense for repairs and without annoyance because of shut-downs, is assured if the Jennings Pump is installed on your Vacuum Heating System.

There are many other reasons why the Jennings Pump is being installed in practically all of the important buildings. Bulletin No. 15 gives them in detail. Write for it.

THE NASH ENGINEERING COMPANY

SOUTH NORWALK, CONN., U. S. A.

TRADE AND MISCELLANEOUS NOTES

Miscellaneous Notes.

Standardization of manufactured products as a means of promoting efficiency and eliminating waste is proposed by the American delegation as a question for discussion at the first meeting of the International Chamber of Commerce in London. Included in the American Committee on Fabricated Production is James Inglis, president of the American Blower Company & Clarence M. Woolley, president of the American Radiator Company.

Industrial Relations Conference, authorized by Governor Sproul of Pennsylvania, is being arranged by Dr. Clifford B. Connelley, commissioner of the Pennsylvania Department of Labor and Industry, to be held in Harrisburg, Pa., October 24-27. The conference will include the features of the Welfare and Efficiency Conferences and Safety Congresses of other years. The main topics to be discussed will include industrial waste, industrial co-operation, industrial publicity, industrial education, women and children in industry and the medical supervision of industry.

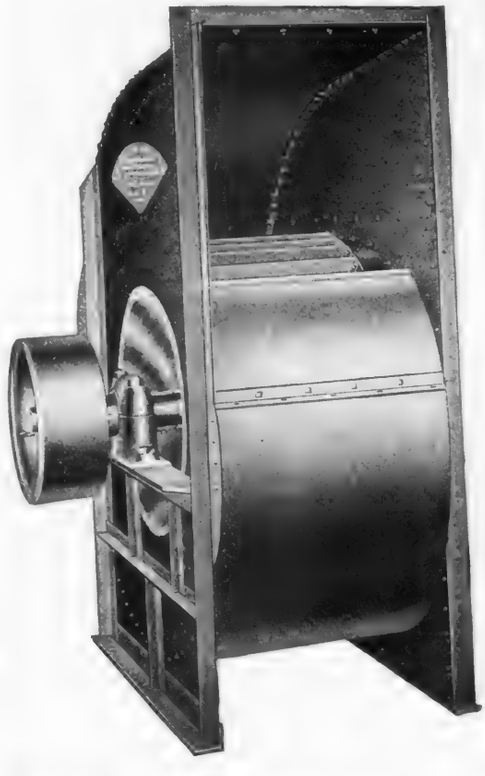
National Pipe and Supplies Association elected Guilford R. Adams, of Rochester, N. Y., as its president at its recent convention in Cleveland. The other officers are: First vice-president, W. E. Clow, Jr., Chicago; second vice-president, L. J. Merkel, Cincinnati; treasurer, George D. McIlvaine, Pittsburgh.

Chicago, Ill.—Building operations have been resumed in Chicago through the agreement between employers and workmen in the steam fitting trade to submit their differences to arbitration. Federal Judge Landis was selected as arbitrator, with full power and authority to act and decide not only the wage question, but working conditions between the various union and contractors' associations of Chicago. The scale proposed by the contractors is at the rate of $1.00 per hour for steam fitters, while the union men have been holding out for $1.25. All of the unions affiliated with the Building Trades Council and the contractors' associations affiliated with the Building Construction Employers' Association and the Associated Builders of Chicago have agreed to abide by the decision of Judge Landis.

New York.—Details of the plan adopted by the Metropolitan Life Insurance Company for placing loans on small dwellings and apartment houses, whereby some $35,000,000 has already been advanced in the form of mortgage loans through the various agencies of the company, are given as follows:

The company appoints a local bank, trust company or mortgage guarantee company its representative for the making of loans on new small dwellings and on new moderate-priced apartment houses. The loans on new dwellings must not exceed $5,000 nor be less than $2,000. The loans on apartment houses depend upon their size and value. It does not entertain loans on houses that have been finished and occupied for some time, as loans of this kind do not add to the housing accommodations of the nation.

No loans are made at more than 50% of the land value and the construction cost of the buildings, omitting carrying charges, overhead or profit. They are made for fifteen years at current inter-



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Uniblade Blowers and Exhausters

UNIBLADE BLOWERS and EXHAUSTERS are used for heating, ventilating, air conditioning, drying, mining and exhaust systems. We manufacture different types of fans to meet the varying conditions of a great number of classes of installations.

UNIBLADE BLOWERS are in such wide use, due to the satisfactory service they render which is the result of excellence of design—based on right engineering principles—and the highest type of workmanship and material.

We now have ready for distribution revised catalog covering UNIBLADE BLOWERS and EXHAUSTERS, copy of which will be forwarded to you on receipt of your request.

Batterman-Truitt Company

General Offices and Works: 730-738 West Monroe St.

CHICAGO, ILL.

est rates, with option to the borrower to pay the entire loan after three years. Interest is paid semi-annually, on the first days of June and December. On every interest date a 3% instalment is paid on account of the principal, all payments being made in New York funds at par.

The banking representative collects interest and instalments, looks after payment of insurance and taxes, and remits twice each year to this company the amount collected. For this service the bank, in some cases, receives one-half of 1% of the interest, provided the company receives not less than 6% net, and in other cases a commission is charged the borrower in the beginning to pay for the services of the bank. The representative must either guarantee absolutely the payment of principal and interest to the company or it must agree to re-purchase any of the loans that became in default.

Where large employers of labor are desirous of building houses to sell to their employees, a similar arrangement can be made. In such cases the employer takes the place of the banking representative. It builds the houses and when finished the company takes over the loans at figures to be agreed upon or which may have been agreed upon in advance of construction. The employer then collects the interest and instalments, frequently by monthly or semi-monthly payments, remitting to the company semi-annually.

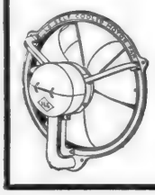
The employer either guarantees outright the payment of principal and interest or agrees to repurchase any of the loans with which there is trouble. In most cases the employers make no charge for service in caring for the interest and instalment payments. In other cases they charge one-half of 1% to the borrower, but a majority of the employers feel that the building and financing of such houses are just as necessary a part of their business as the factory buildings that shelter their plants and operators.

It is stated that in New York City alone, within a comparatively short

HIGH EFFICIENCY TRADE ILG MARK VENTILATING MACHINERY

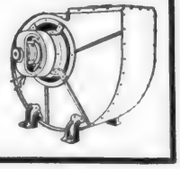
Ventilation
FOR OFFICES · STORES · FACTORIES · PUBLIC BUILDINGS RESTAURANTS · THEATRES · HOUSES · ETC.

Contractors and Dealers who sell ILG Self Cooled Motor Fans and Universal Blowers, find public interest in ventilation growing every day

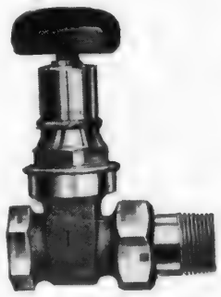


A share of this business awaits you everywhere
The season for ventilating apparatus is here

ILG ELECTRIC VENTILATING CO.
Branches in all large cities 2858 N. Crawford Ave., CHICAGO, ILL.



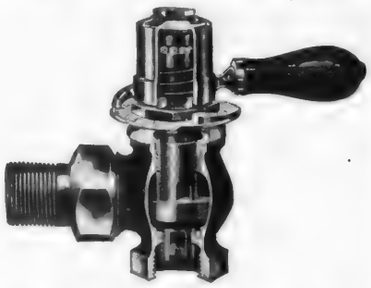
Dole



WE elected years ago to be the builders of the best radiator valves on the market. We have succeeded in our ambition. If any man desires to study the radiator valve field—he will become convinced of the fact that Dole Radiator Valves dominate their market.

A VALVE FOR EVERY SYSTEM

Write for catalogue and discounts



DOLE VALVE CO., Chicago, Ill.
1933 Carroll St.

REG. U.S. PAT. OFF. TRADE JENKINS MARK

Jenkins Bros

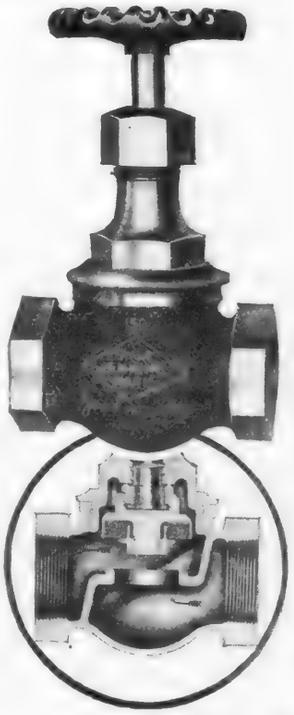
Standard Brass Globe Valve

Fitted with Jenkins Renewable Composition Disc which takes up the wear and gives the valve practically unlimited life.

For 150 pounds working steam pressure, or 250 pounds working water pressure. (Extra Heavy patterns for higher pressures.)

Note free, full opening.

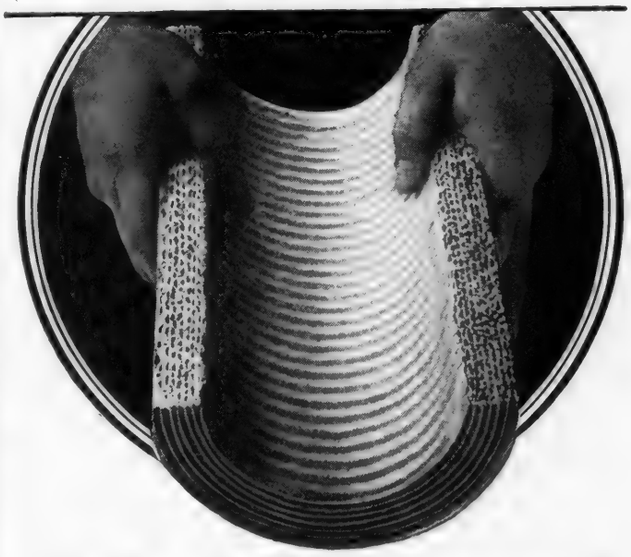
Merit tempts imitation—Jenkins Valves are made only by Jenkins Bros. and are stamped on the body with the name and Jenkins Diamond Mark—a valve without this identification is *not* a Jenkins. At supply houses everywhere.



JENKINS BROS.
New York Boston
Chicago Philadelphia
Montreal London Havana
FACTORIES: Bridgeport, Conn. Elizabeth, N. J.; Montreal, Can.

Jenkins Valves
SINCE 1864
2277-J

See how the corrugations run *around* the pipe—



It's Asbestocel

WHEN Johns-Manville Asbestocel is used, air cannot circulate lengthwise through the insulation, parallel to the pipe. For in Asbestocel the alternate layers of plain and corrugated Asbestos felt form closed, "around-the-pipe" loops in which the air is confined.

That's why Asbestocel saves more heat

And in addition to saving heat, this unique construction also gives Asbestocel unusual ability to withstand hard knocks and long, severe usage.

Asbestocel is specially recommended to insulate low and medium pressure steam and hot water lines in all types of buildings.

The Johns-Manville booklet contains much valuable data about insulations. Write for it.

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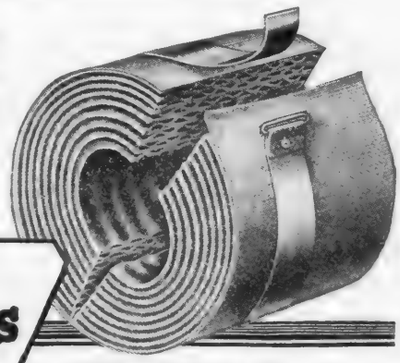
Madison Ave., at 41st St., N. Y. C.
Branches in 64 Large Cities
For Canada:
CAN. JOHNS-MANVILLE CO., Ltd., Toronto



Johns Manville Service
Covers the Continent

Through—

Asbestos
and its allied products
JOHNS-MANVILLE
Serves in Conservation

Heat Insulations, High Temperature Cements, Asbestos Roofings, Packings, Brake Linings, Fire Prevention Products

JOHNS-MANVILLE
POWER PLANT MATERIALS

time, the company has arranged and authorized loans of $13,000,000 for the erection of 64 apartment houses. A number of residential projects, involving an additional $3,000,000, it is stated, are being negotiated.

National Association of Master Plumbers, at its recent annual meeting in New Orleans, elected the following officers: President, Joseph W. Cannon, Chicago; treasurer, R. J. Welch, Lowell, Mass.; secretary, Charles A. Dreier, Chicago. An attendance of over 500 was registered at the convention, the delegates alone numbering 327.

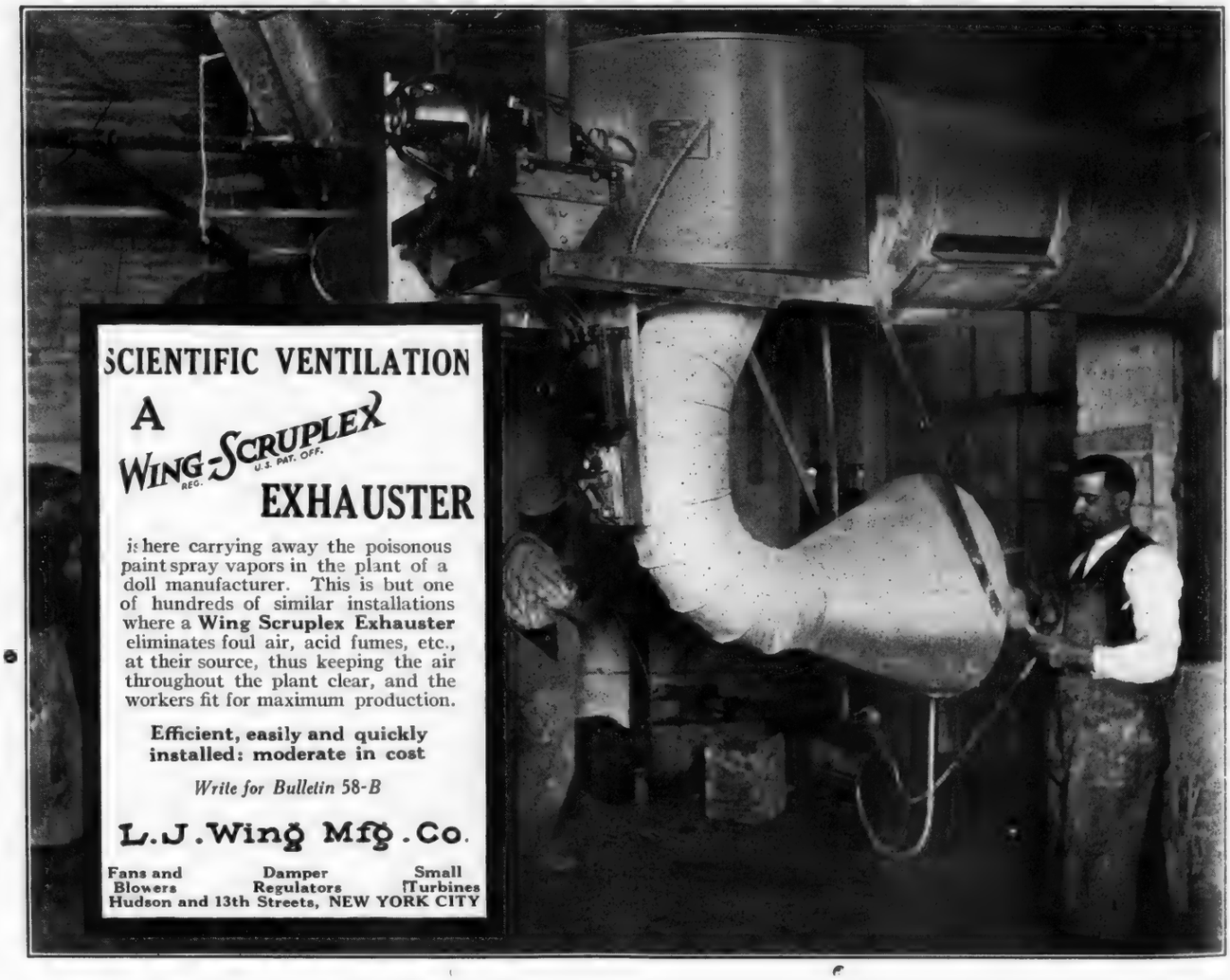
Edward E. McKeighan, sales manager of the heating division of the Fulton Co., Knoxville, Tenn., manufacturers of the Sylphon line of heating specialties, has resigned his position, and will return to his former home, Kansas City, Mo., the last of August, and enter business as a manufacturer's agent, selling heating and power specialties.

Building Operations in June totaled 6% less than in May, according to the F. W. Dodge Company' review of building activity. Contracts awarded during June in the 27 northeastern states of the country amounted to $227,711,000. Those sections in which labor troubles have been most pronounced were the ones in which decreased building activity was evident. Furthermore, the latter half of June showed up more strongly than the first half. Included in the June total were: $75,175,000, or 33% for residential buildings; $52,967,000, or 25% for public works and utilities; $25,493,000, or 11% for business buildings; $23,441,000, or 10%, for educational buildings; and $18,502,000, or 8%, for industrial plants.

The first half of this year has shown up quite favorably in comparison with previous years. From January 1 to July 1 the total amount of contracts awarded has been $1,066,256,000. This figure is 9½% greater than the average semi-annual total for the preceding five years.

In the New England States the June figures were 14% lower than those for May. In New York State and northern New Jersey there was a slight increase of 8%. The middle Atlantic States registered the most notable decrease, amounting to 27%. In the Pittsburgh district there was an increase of 16%. The central West reported a decrease of 16%, while the Northwest reported a 12% increase.

National Chemical Exposition, which promises to be the greatest in the history of the chemical industry in the United States, will be held in the Eighth Coast Artillery Armory, New York, during the week of September 12. Thus far, more than 400 exhibitors will have places in the exposition. Last year the total was 457. Among the speakers on evaporating and drying subject will be A. E. Stacey, of the Carrier Engineering Corporation, whose subject will be "The Relation of Atmospheric Conditions to Chemical Processes," A. S. Lissauer, of W. L. Fleisher & Co., who will discuss "Air Conditioning as a Drying Problem; J. D. Stein, of the Grinnel Company's Drying Division, who will speak on "Atmospheric Drying by Means of Compartment, Tunnel and Continuous Belt Conveyor Dryers, with Some Practical Applications;" and M. H. Dickerson of the Atomized Products Company, whose topic will be "Spray Drying." A complete small-size Merrill Process system, as well as a high-duty humidifier will be installed in one of the exhibits, where the manufacturing results achieved in plants with humidifying systems under automatic control will be demonstrated.


SCIENTIFIC VENTILATION
A
WING-SCRUPLEX
REG. U.S. PAT. OFF.
EXHAUSTER
is here carrying away the poisonous paint spray vapors in the plant of a doll manufacturer. This is but one of hundreds of similar installations where a Wing Scruplex Exhauster eliminates foul air, acid fumes, etc., at their source, thus keeping the air throughout the plant clear, and the workers fit for maximum production.
Efficient, easily and quickly installed: moderate in cost
Write for Bulletin 58-B
L.J.Wing Mfg.Co.
Fans and Blowers
Damper Regulators
Small Turbines
Hudson and 13th Streets, NEW YORK CITY

SPECIFY BUFFALO

One of the Important Factors of Every Building about to be constructed is the Heating System. Obviously to give the client the most for his money is the first consideration.

It is comparatively simple to install a heating system, but it is another matter to make it always efficient.

Buffalo Fan Systems are no higher in first cost, and their upkeep is off-set by the saving in heat, the increase in efficiency of the workers.

Putting heat mechanically just where it is wanted by keeping it in circulation instead of letting it escape thru the ventilation in the roof, is the cheapest and best way.

Our Catalogs give valuable engineering data on heating and ventilating problems. Our engineering department is always available for consultation.

Write Dept. 37

Offices in All Principal Cities

BUFFALO FORGE COMPANY

BUFFALO, N. Y.

An oil heat transmission system capable of delivering air at 600° will be among the exhibits.

Federated American Engineering Societies, representing a combined membership of 50,000 engineers, is calling special attention at this time to its employment bureau for engineers of every variety of training and experience, which it is conducting at 29 West 39th Street, New York. Applicants must be members of the societies represented in the Federated American Engineering Societies and must submit a complete educational and professional record which is carefully classified so that, as the special requirements of any position are received, the records of men of suitable qualifications are submitted for consideration. The relatively large number of men with whom the bureau is in touch, the comprehensive classification of records, and the fact that the services of the bureau are free to employer and member alike, renders possible the selection of the right men for the service required. Negotiations may be confidential, if desired. The high standards required for membership in any of the member societies insure the quality of men available, and the bureau, it is stated, will welcome inquiries from those seeking to build up or expand their engineering organizations. Walter V. Brown is the manager of the bureau.

Washington, D. C.—Instead of waiting for some mysterious set of forces to restore good times, the people of the United States have settled down to the grim and sober business of working out their own salvation, writes Archer Wall Douglas, chairman of the Committee on Statistics and Standards of the United States Chamber of Commerce of the United States, in his monthly review of business conditions in *The Nation's Business* for August. According to Mr. Douglas, the chronicle in industrial life includes a slow increase in construction as the costs of material and labor decline in different sections, more particularly in the large cities.

Cleveland Building Show will be held this fall in the new $5,000,000 public hall in Cleveland, O. This hall has 70,000 sq. ft. of exhibition space. Incidentally the show this year will celebrate the 125th anniversary of the founding of Cleveland and the opening up of the vast lake region. The scope of the exhibits will extend from real estate and building financing, through structural materials to equipment, fixtures, decorations and the last touch in furnishings. Offices of the exposition have been opened at the Cleveland Builders' Exchange. The director-general is Ralph P. Stoddard, who managed the first complete building show in 1916, and the convention secretary is A. J. Kennedy, Chamber of Commerce, Cleveland.

Licensing of engineers in New York State, which will begin May 6, 1923, or two years after the date of the recently-enacted law on the subject, will embrace the following requirements:

No engineer unless licensed may legally practice professional engineering or land surveying after May 6, 1923.

In a corporation, partnership, or joint stock association engaged in the practice of engineering the engineer in responsible charge of the work must be licensed. Subordinate engineers who report to such an engineer need not necessarily be licensed.

Among the exemptions allowed non-resident engineers practicing in New York State are the following, no license being required in each case:

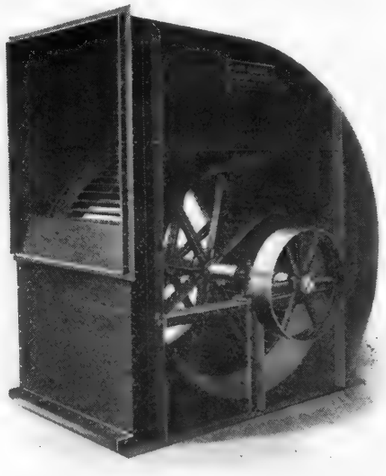
1. Offering to practice when having no established place of business in New York State.

2. Practicing when having no established place of business, provided such practice does not aggregate more than 30 days in one calendar year and provided such non-resident engineer is legally qualified for such professional service in his own State or country.

3. Practicing professional engineering or land surveying, provided application for license is pending, and fee has been paid. Such exemption to continue only for such reasonable time as is required for granting or denying of application. Further exemptions are made for engineers practicing as pupils or under the direction of a licensed engineer, or practicing on work solely for the United States government, and further, practicing solely as an employee of the State from the time the act becomes effective until the expiration of the then existing term of office of such employee.

Buckeye Multiblade Fans

are made especially for low pressure Heating and Ventilating work. They are giving perfect satisfaction.



CORRECT DESIGN, HEAVY CONSTRUCTION, NOISELESS OPERATION, WORKMANLIKE FINISH, HIGHEST EFFICIENCY.

Our Engineering Department is maintained for the purpose of assisting Engineers, Architects, etc., in planning efficient Heating and Ventilating Systems for all buildings.

THIS DEPARTMENT IS FREE TO YOU

We also manufacture a complete line of Disc, Cone and Steel Plate Fans:

Write Department D

BUCKEYE BLOWER CO.

COLUMBUS, OHIO

"Sirocco" TRADE MARK

Clean, Conditioned Air

For Industrial Plants

IN many industries the biggest factor to economical production is cleaned, conditioned air. A chocolate candy plant is one example. The air must be just right for the proper handling of the candy, otherwise production slumps, losses mount.

AN "A B C" AIR WASHING AND COOLING FAN is making possible cleaned, conditioned air in hundreds of industries today.

This fan can be installed at comparatively small expense, is economical of room and cleans the air in a thoroughly satisfactory manner.

Heating and ventilating contractors are invited to write us for detailed information on this "A B C" Air Washing and Cooling Fan.

AMERICAN BLOWER COMPANY
DETROIT, MICH.

Special Advantages of the "A B C" Air Washing and Cooling Fan.

1—*Purifies* the air by removing all solid particles.

2—*Humidifies* the air by accelerating evaporation of circulating water.

3—*Cools* the air because the process of evaporation withdraws heat.

PACKING ROOM OF THE CRANE CHOCOLATE CO. CLEVELAND, O.

"Sirocco" Air Washer-Fan Unit Installation maintains the low temperature of purified air required for the handling of fine confections in this plant.

The registration fee is $25.00 for a license either as a professional engineer or as a land surveyor. The yearly renewal fee is $1.00 if made prior to December 31, with a penalty of ten cents for each month's delay.

New York.—According to a report of Henry H. Curran, President of the Borough of Manhattan, made public July 16, housing construction, so long dormant, is now well under way. The report covers the period from the enactment of the housing relief laws, effective February 25, when tax exemptions were granted for the construction of homes built to relieve the crowded conditions, to July 9, when the total investment in new houses reached $100,000,000 in the greater city, as indicated by the plans filed with the building departments in the five boroughs. This investment, states the report, will furnish homes for 20,897 families.

Cleveland, O.—Work on some $40,000,000 worth of building operations was renewed when the strike in the building industry was settled by arbitration, after five weeks of suspended activities. The men accepted an average wage cut of 17%, as against the 20% reduction proposed by the employers. The arbitration board was made up of 21 members, representing the workers, the employers and the public. $25,000 men were affected by the decision.

Miller Reese Hutchinson, Inc., Woolworth Building, New York, has been organized by a number of inventors, engineers, scientists and financiers, with the object of affording every opportunity to fundamental ideas that are sound and practical and to their perfecting and marketing. The young inventor, it is stated, will have protection in the development of his ideas and in certain cases he will have financial help during the period of his experiments, besides being protected in the securing of his patent and the manufacture of his product. It is proposed to have every invention judged and tested by a group of experts in the various specialties embraced. Miller Reese Hutchison, who is president of the new organization, was formerly chief engineer for Thomas A. Edison, and is the inventor of the miniature "super gun" which was featured in the papers recently as having shot a steel bullet 3 in. long and 1/2 in. in diameter through a 3/4-in. steel plate at a velocity of a mile a second. In the demonstration of this "super gun," there was no percussion and no recoil, while the report was no greater than the click of a cash register. When developed to its full power, it is claimed by ballistic experts, the gun may be capable of hurling a several-ton projectile, at a velocity of five miles a second, several hundred miles. It is planned, however, to develop the "super gun' for industrial uses, in which capacity it is compared with a sewing machine, literally sewing steel plates together. Among the directors of the organization are William M. Williams, Alfred D. Flynn, F. D. Carney, George C. Dean, Richard B. Scandrett, Jr., and Embury McLean.

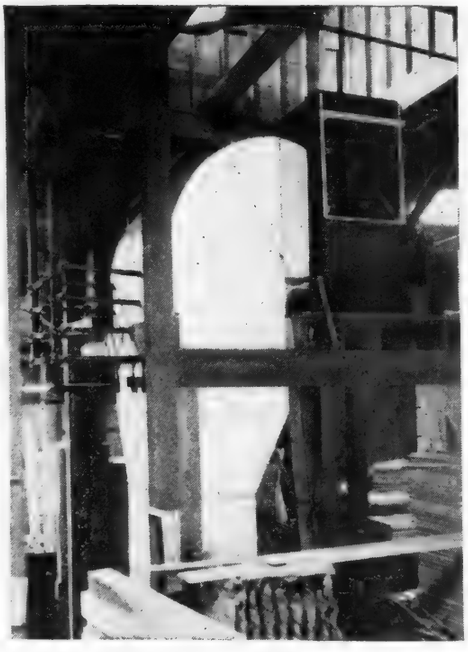
Arthur M. Greene, Jr., professor of mechanical engineering at the Rensselaer Polytechnic Institute, has been called to become the dean of the enlarged School of Engineering at Princeton University and professor of mechanical engineering. It is stated that he will take up his new duties in the fall of 1922. Professor Greene is well known to heating engineers through his writings on heating subjects. He is at present chairman of the Research Committee of the American Society of Mechanical Engineers, a member of that society's Boiler Code Committee, and chairman of its Special Committee on Steam Piping.

New York.—In an outline of a proposed constructive program for relieving the housing shortage problem, based on the facts brought out by the Lockwood Committee investigation in New York, Samuel Untermeyer, the committee's chief counsel, has offered the following proposals:

1. Competitors to be permitted to become members of trade associations, but only under rigid Federal supervision, and anyone in an organization not so supervised or sanctioned to be subject to criminal prosecution.

2. The amendment of the Federal and State laws so that the courts should be compelled to impose prison sentences in case of convictions, and should not have the power to suspend sentences.

3. The limitation of investments of financial institutions holding the people's



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Installed with indirect heating plant

BLOWERS!?

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Solid "V" Blade Construction
Long Life
Maximum Service
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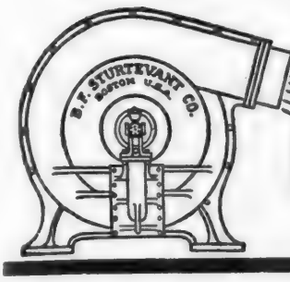
Write for our catalog and data book

Sales agents wanted in all territories

HACKNEY MANUFACTURING CO.
ST. PAUL, MINN.
Manufacturers of Blowers and Ventilating Equipment



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REG. U.S. PAT. OFF.

PUTS AIR TO WORK

THE Travelers Insurance Building at Hartford, Conn., is an enduring monument to a great commercial enterprise. Permanence in the structure and comfort to the occupants were the guiding principles in its design and construction.

In the important detail of ventilation both requirements have been successfully met with

Sturtevant Equipment

The long list of important buildings in the country equipped with Sturtevant appliances is the best evidence of continued satisfaction to both owners and architects. The wide experience of our corps of engineers insures competent advice and we invite you to consult us on your heating and ventilating problems.

B. F. STURTEVANT COMPANY

HYDE PARK, BOSTON, MASS.

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BOSTON, MASS. 555 Mass. Trust Bldg.
BUFFALO, N. Y. 100 Bedford Ave.
CHICAGO, ILL. 530 So. Clinton St.
CINCINNATI, OHIO 604 Provident Bank Bldg.
CLEVELAND, OHIO 330 Guardian Bldg.
DALLAS, TEXAS 3411 Knight St.
DETROIT, MICH. 406 Marquette Bldg.
HARTFORD, CONN. 36 Pearl St.
KANSAS CITY, MO. 3830 Park Ave.
LOS ANGELES, CALIF. 411 Hollingsworth Bldg.
MINNEAPOLIS, MINN 804 Met. Life Bldg.
NEW YORK, N. Y. 52 Vanderbilt Ave.
PHILADELPHIA, PA. 135 No. Third St.
PITTSBURGH, PA. 711 Park Bldg.
ROCHESTER, N. Y. 1024 Granite Bldg.
ST. LOUIS, MO. 2086 R'y Exchange Bldg.
SALT LAKE CITY, UTAH 818 McIntyre Bldg.
SAN FRANCISCO, CALIF 759 Monadnock Bldg.
SEATTLE, WASH. 1105-1106 White Bldg.
WASHINGTON, D. C. 1006 Loan & Trust Bldg.
B. F. STURTEVANT CO. OF CANADA, LTD. GALT, ONT.
MONTREAL 404 New Birks Bldg.
TORONTO 213 Lumsden Bldg.

money, and provision for the compulsory investment on real estate bond and mortgage of a certain proportion of the entire investment.

4. The repeal of the usury laws as to all loans on real estate mortgages of $10,000 and upwards. Usury laws with respect to large real estate transactions have become obsolete, and, however unwillingly, "we must recognize that money is a commodity, and goes to the highest bidder."

5. Amendment of the present laws relating to city contracts so that whenever a contractor defaults on a contract for city construction work the city shall have the option of adopting all existing sub-contracts instead of being required to reject them all and to readvertise for bids.

6. Amendment of the Penal Code, so as to give the people the same right of appeal in criminal cases as that now possessed by the defendants, except that the people shall only have the right to appeal on questions of law.

Pittsburgh, Pa.—Some of the most elaborate ventilation tests ever planned are being arranged by the Bureau of Mines for the purpose of determining the best method of ventilating the highway tubes which are being driven under the Hudson River between New York and New Jersey. Workmen are now engaged in building a tube 400 ft. long and 16 ft. high and 9 ft. wide. Through this experimental tube automobiles will be driven under conditions suggested by the New York-New Jersey tunnels. The engineers will then determine the best means for carrying off the exhaust gases from the cars and will embody them in a ventilation system for the new tunnel. The experiments will be conducted by J. W. Paul, of the Pittsburgh Station of the Bureau of Mines, during the latter part of this month.

Davenport, Iowa.—A typical expression of the misconceptions regarding the effect of ozone in ventilating such structures as school buildings is reported from Davenport where, in discussing this question, President Dahms of the School Board is quoted as stating: "If there is an unusual odor about the school building, we don't want it hidden by the oxidizing element, but want it to be discovered so that the cause may be removed by proper cleaning. The presence of ozone in the air may serve to purify it, but I believe our present system of ventilation by fans is entirely practical and does not have to be improved."

Kansas City, Mo.—According to an agreement made between the master steam fitters and the plumbers' and steamfitters' unions of Kansas City, the wages of journeymen steamfitters and plumbers are fixed at $9.00 a day, and the fitters' helpers at $5.50 a day, beginning July 18 and ending July 1, 1922. The reduction amounts to a decrease of 12½ cents an hour, or $1.00 a day. The previous wage was $1.25 an hour. It is estimated that the reduction will mean a saving to the building industries of the city of $250,000 a year.

Austin, Texas.—The Board of Regent of the University of Texas has granted an appropriation of $27,500 to purchase new equipment for the heating plant of the School of Medicine at Galveston.

Central Station Heating Notes.

St. Louis, Mo.—Financial statements and other exhibits by the Union Electric Light & Power Company have been presented to the State public service commission in connection with the company's petition for an increase of 10% in rates for steam heat in the downtown office buildings of St. Louis.

Urbana, Ill.—There is to be a new central heating system in the Urbana business district which will be installed before the Main Street pavement is relaid. The plans call not only for new and larger mains, but for new service laterals as well. The Urbana Light, Heat & Power Company, which will install the system, has recently floated a bond issue of $231,000 which, it is stated, was promptly snapped up.

Bloomington, Ill.—The public utilities commission has issued an order, under date of June 22, re-suspending the proposed advances in steam heating rates in Bloomington until December 22, 1921.

Hotel Claridge
New York

Equipped throughout with batteries of Massachusetts Fans.

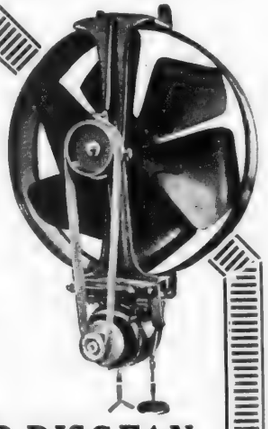
Massachusetts
Modified "Squirrel Cage" Fans

possess the distinct and unusual advantage of "great capacity in small space," and this great capacity is obtained, not at a sacrifice of efficiency, but at higher efficiency than is possible with other forms of fans. For a given volume, it is smaller, cheaper in first cost and in cost of operation. The smaller wheel is driven at a higher rotative speed than was economical with the old paddle-wheel type; the smaller wheel at a higher speed means smaller motor and engines when direct connected, and these are also cheaper in first cost and operation.

Massachusetts Blower Co.
Watertown, Mass.

A NEW
Bayley Product

IN THE FORM OF a light and easily installed disc ventilating fan, made in sizes varying from 20 inches to 48 inches is hereby introduced to the ventilating trade



BAYLEY JUNIOR DISC FAN

The Bayley Junior has specially shaped floats designed to move a maximum volume of air, with a minimum of power It is simple in construction, has few moving parts and is equipped with ball bearings throughout.

The Bayley Junior can be furnished for either line shaft drive or with individual motor drive with a speed variation of from 2½% to 100% of maximum speed.

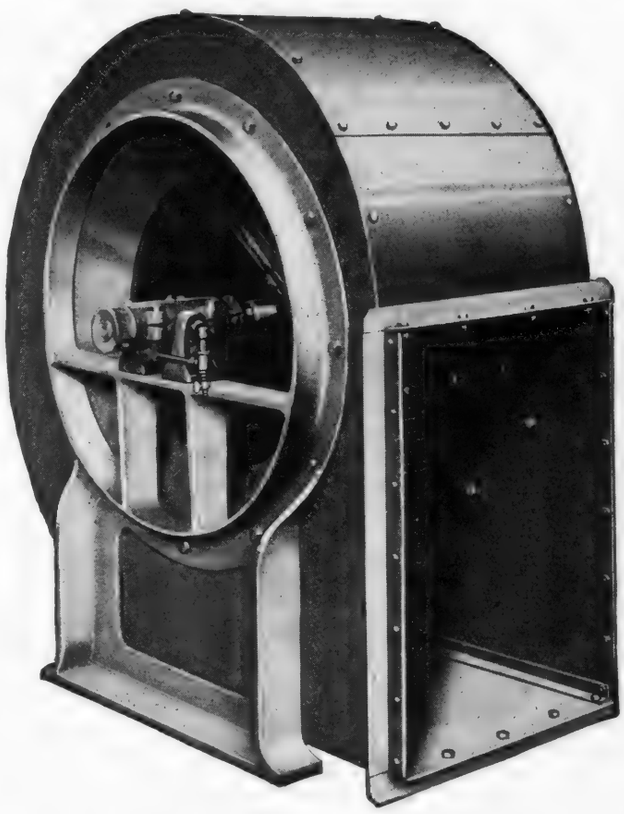
This variation is accomplished by a patented belt tention arrangement that permits the use of a standard constant speed motor thus eliminating the expensive and troublesome variable speed motors used on ordinary variable speed fans.

Write for Bulletin Today

BAYLEY MFG. CO.
Dept. E. MILWAUKEE, WIS.

The New York Blower Company

SERI-VANE FANS



Cut shows our standard type "C" Seri-Vane Fan as made in all sizes to and including number six—wheel diameter 36 inches. You will note fan is reversible as to both hand and discharge. Any special angular discharge can be readily attained with a minimum of labor. We stock all sizes of these fans so can ship any hand or discharge within twenty four hours from receipt of order at our factory.

Are you using our Mushroom Ventilators? If not, write for prices and literature and save labor of your men and your money.

THE NEW YORK BLOWER COMPANY

513 Transportation Building

CHICAGO, ILL.

Factory: Laporte, Ind.

For prompt service, write nearest sales office

Please mention THE HEATING AND VENTILATING MAGAZINE *when you write.*

Other cities affected by the decision are Clinton and Galesburg.

Charleston, Ill.—The Central Illinois Public Service Company has notified the users of central heat in Charleston that on June 1, 1921, the company permanently discontinued the furnishing of heat to its patrons and abandoned all its rights under a franchise granted the company for this purpose some years ago. This franchise has some years still to run.

Bucyrus, O.—Application has been made to the city council by John P. Boyd for a franchise for a central heating plant, to furnish hot water for heating purposes to the local business district. It is planned to start construction next year. Mr. Boyd is the local manager for the Ohio Power Company.

Springfield, Ill.—The city of Springfield must pay $2,108,412 if it is to take over the electric and heating plants of the Springfield Gas & Electric Company and obtain by August 15 complete municipal control of all electric and heating business. This is the price two of the three members of the board of arbitration, named to fix a fair value of the company's combined plants, have determined is the value of the properties. As against this figure, the city's representative on the board, Delos F. Wilcox, declares, in a dissenting report, that the two plants are not worth more than $1,000,000.

According to Commissioner Willis J. Spaulding, who has led the fight for municipal ownership, to accept the award would probably bankrupt the city and would result in higher rates for electric and heating service than the company is now charging, besides requiring the city to increase at least 30% the rates to its own 3300 customers, because if the city took over the company's plant it would be impractical to have two sets of rates. He states further that the plant in question would need to be rehabilitated at once at an estimated cost of $857,000. The other two members of the arbitration board are John F. Wallace, who was selected by the Forum Committee of the Chamber of Commerce and William J. Hagenah, representing the utility company.

The next move in the negotiations will be to call for a special election to ratify or reject the plan for the purchase of the company's plant at the figures named in the majority report of the board of arbitration.

In the minority report filed by Mr. Wilcox, he refers to the reproduction-cost-new formula at current prices used in the majority report, with a reduction for accrued depreciation and an addition for going value. He then expresses his opinion that the majority have given no weight to the following considerations:

"(1) Average or normal prices as contrasted with the prices prevailing at the present moment.

"(2) That special depreciation attaching to the company's properties on account of duplication, obsolescence and lack of adaptability to the city's uses.

"(3) The fact that the city now has a lighting plant in successful operation and that the city is in a position to provide itself with an efficient substitute for the company's properties by the development and extension of the existing municipal plant.

"(4) The fact that during the last twenty years the company has enjoyed a revenue derived from its consumers in Springfield and vicinity sufficient to have yielded a 7 per cent return each year upon the full amount of the original investment and to have accumulated a surplus more than sufficient to amortize the entire original cost of the properties.

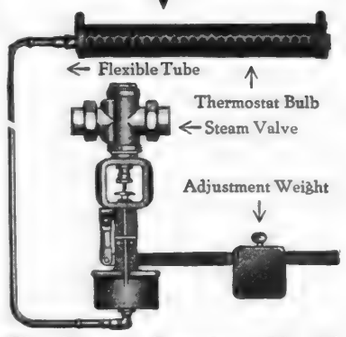
In the event of a discontinuance of the heating service, it is being proposed by Commissioner Willis J. Spaulding that a heating plant be established in the new building to be erected for the use of the street department on Monroe Street. By putting boilers in the basement of the building and connecting them with the present piping system, it is stated, the City Hall, engine house, Lincoln Library, Day Nursery and Y. M. C. A. buildings could be heated.

Manufacturers Notes.

Edwards Valve & Mfg. Co., East Chicago, Ind., has plans drawn for a new plant building to replace the structure recently destroyed by fire. The reconstruction work will cost about $400,000. W. T. Branitsky, of Chicago, is the architect.

Kelly Valve Co., Chicago, Ill., manu-

Heat Regulation Reduces Accidents



The Powers Regulator No. 15

This Regulator is designed for the control of air temperature in drying rooms of all kinds. Prevents use of more heat than is required. Easily installed. Entirely automatic, reliable, and accurate.

Men and women in the office or shop always work faster and with fewer errors and accidents when the rooms are **automatically** maintained at an **even temperature.**

Automatic control on processes involving heat results in a more uniform production with saving of material, fuel, and man power.

This is a worth-while saving in every instance.

Power Regulators insure that saving.

Let us show you how it is done.

Ask for Bulletin 138

Try One in Your Own Factory

Tell us where you have difficulty with uneven temperatures, and we will send you a suitable regulator for trial in your own factory. If you are not satisfied, send it back at our expense.

THE POWERS REGULATOR CO
Specialists In Automatic Heat Control

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565 Boston Wharf Bldg. BOSTON
The Canadian Powers Regulator Co., Ltd.
TORONTO, ONTARIO

(1209)

Westinghouse
Ventilating Equipment in the INDUSTRIAL PLANT

W
WESTINGHOUSE ELECTRIC

Westinghouse engineers have specialized in the design of high grade equipment for ventilating work.

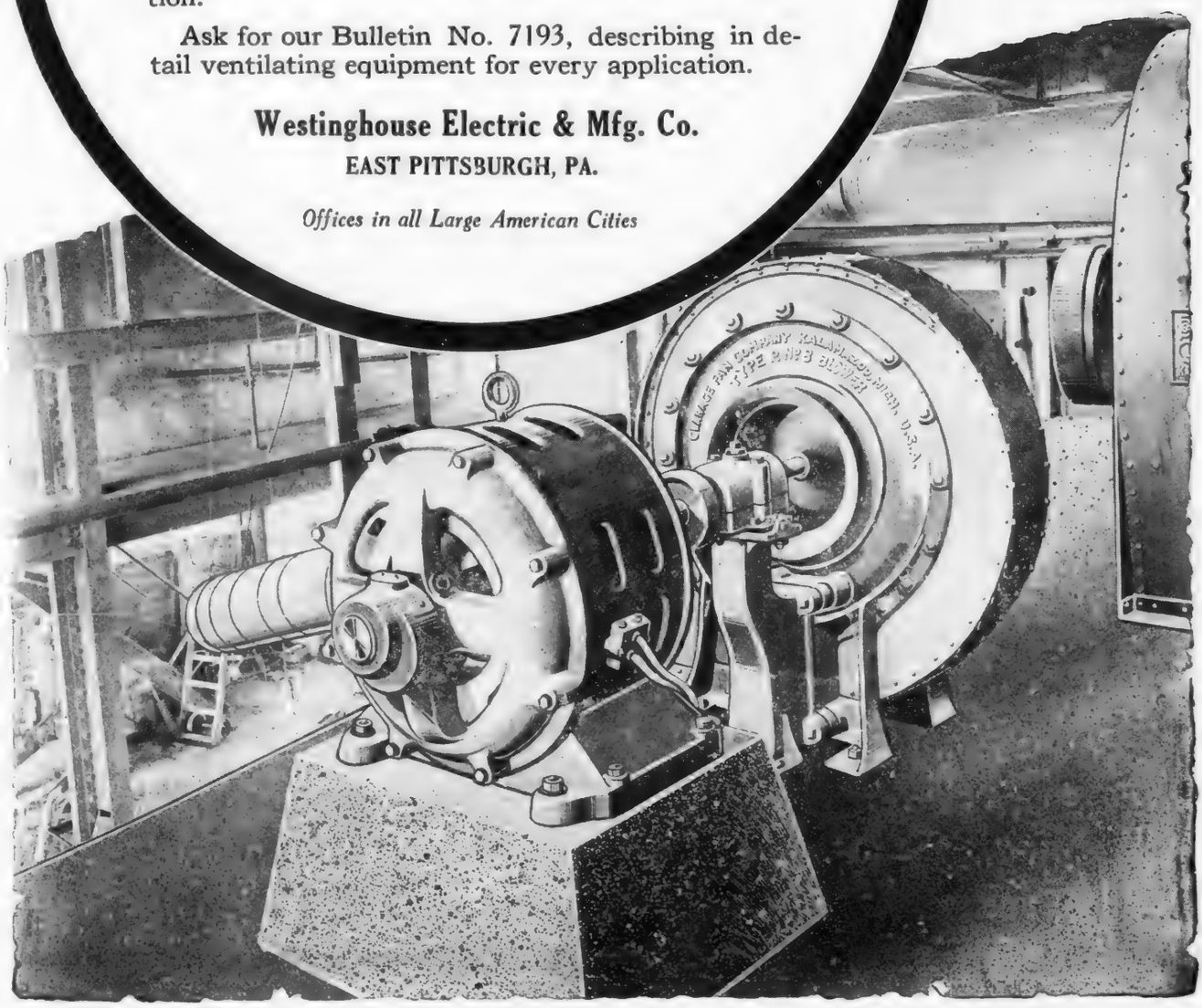
Motors and controllers have been designed for ventilating service in factory, home or school.

Big hotels, such as the Pennsylvania, in New York and many factories and schools all over the country, are using this equipment and running it continuously day and night with practically no care or attention.

Ask for our Bulletin No. 7193, describing in detail ventilating equipment for every application.

Westinghouse Electric & Mfg. Co.
EAST PITTSBURGH, PA.

Offices in all Large American Cities



facturer of the Kelly controller for boilers, has been reorganized, both from the standpoint of production and financially. Frank A. Colborn has been elected president and general manager. The reorganized company is capitalized at $1,000,000.

Atlas Valve Co., Newark, N. J., manufacturer of the Atlas, Standard and Victor regulating devices, announces the removal of its New York office to 242 Lafayette St. E. E. Jones is manager for the New York district.

Anti-Corrosion Engineering Co., New York, owner of the Speller process for deactivating water, has, among its officers, J. F. Musselman, vice-president and mechanical engineer; Homer Addams, vice-president; and Perry West, secretary and executive engineer. The company is headed by Dr. Charles V. Paterno and its consulting chemical engineer is Dr. William H. Walker.

Babcock & Wilcox Co., New York, has appointed Isaac Harter as general superintendent of the company, to succeed the late James P. Snedden. Mr. Harter was previously assistant to the president. Mr. Harter's entire business career has been spent with what is now the Babcock & Wilcox Company.

New Incorporations.

Reliance Boiler Works, Pittsburgh, Pa., organized to manufacture steam heating boilers and other products. Incorporators: William Olexon, H. C. Feldstein and Raymond Collins.

Cullen Vapor Heating Co., Jersey City, N. J., organized to manufacture heating specialties. Incorporators: Timothy F. Reilly, James A. Kinkead and Thomas J. Cullen.

Combined Grate and Radiator Heating Co., Knoxville, Tenn., capital $30,000, to manufacture radiators and other heating equipment. President, H. E. Kelly; general manager, W. E. DeArmond. The company will operate a plant at Fountain City, Tenn.

Bancrift Heating Co., Inc., Boston, Mass., manufacturer of heating systems, capital $10,000. Incorporators: Daniel T. Mulcahy and John F. Mulcahy of Worcester and Alice I. Duggan of Whitinsville.

Ames & Bullach Plumbing and Heating Co., Massillon, O., capital $25,000. Incorporators: Orrin F. Ames, Wilson G. Bullach, Grace G. Bullach, Laura Ames and T. G. Snyder.

New Firms and Business Changes.

David H. Cuyler, New York, has joined the staff of Miller & Brady, Inc., New York, heating contractors.

Phillips-Getschow Co., Chicago, Ill., has been taken over by George M. Getschow through the purchase of the interest of his partner, George J. Phillips. The business will be continued under the present name. Mr. Phillips has been president and treasurer of the firm since its organization.

Contracts Awarded.

Mount Vernon, Wash.—Among the bids submitted for the heating of the proposed high school and gymnasium in Mount Vernon, were the following: McMahon Plumbing and Heating Co., Seattle, $26,400 (low bid); Dupar-Blythe Co. Seattle, $26,410; University Plumbing & Heating Co., Seattle, $26,938; Oscar Volk, Mount Vernon, $27,500; Hellenthal Plumbing & Heating Co., Seattle, $27,880; Bergh-Griggs Co., Tacoma, $28,190; Hughes & Cormier, Mount Vernon, $28,700; Ashwell & Twsit, Seattle, $29,346; C. A. Richardson, Tacoma, $29,889; Eckart Plumbing & Heating Co., Seattle, $30,407.

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A rapidly growing concern of heating and power engineers and contractors, handling large contracts, have an opening in their organization for a competent heating engineer who is an expert in handling mechanics, estimating labor, and who can complete the work within the estimated amount.

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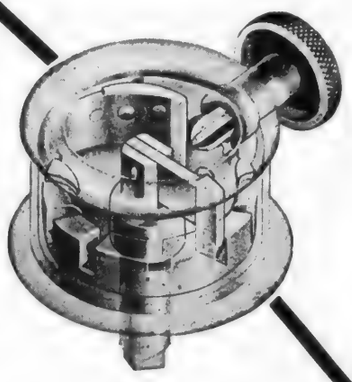
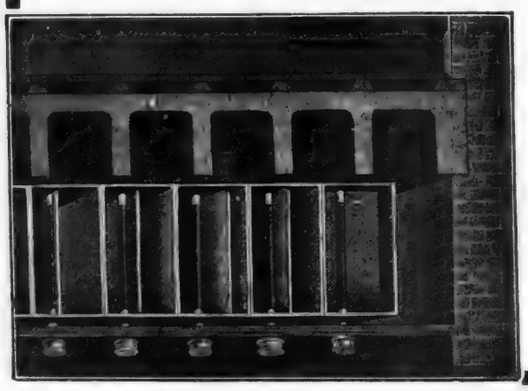


This device, when placed on a battery of ducts in the collecting chamber near the machinery room, not only affords an easy and convenient means of regulating the flow of air, but also serves as a positive means of indicating the room to which each duct leads, by means of the numbered or lettered cover windows.



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Engineering News-Record

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Fire and Water Engineering
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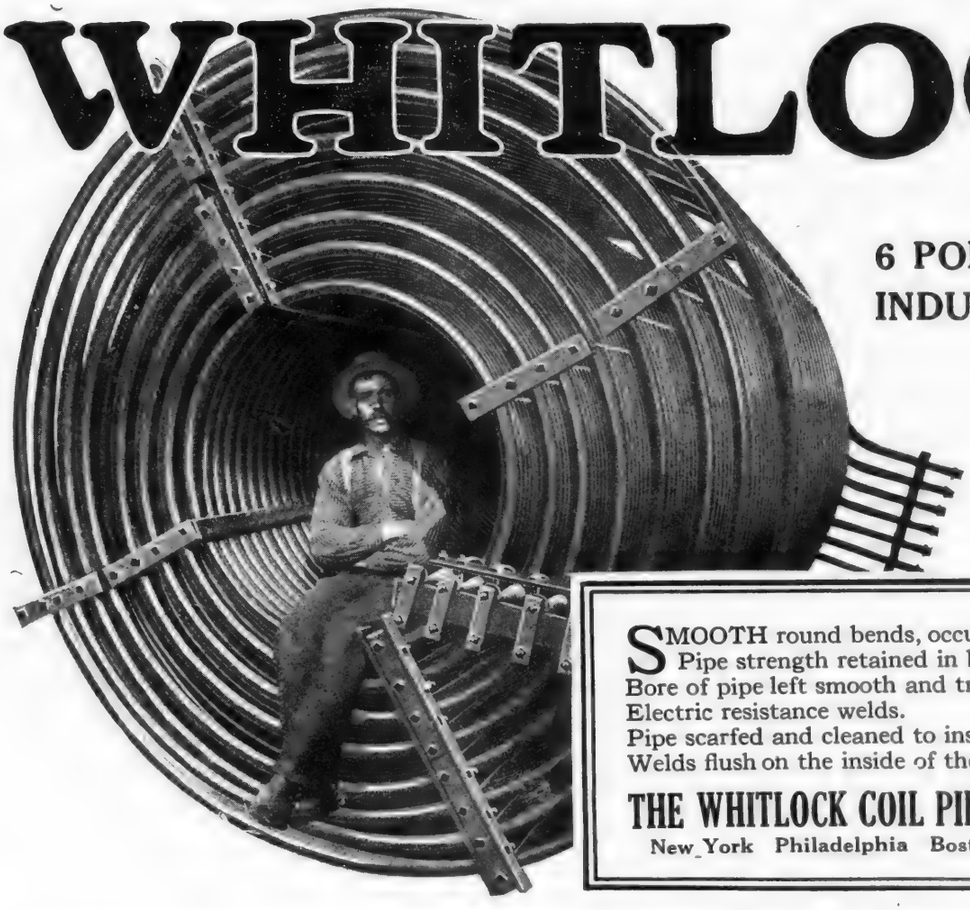

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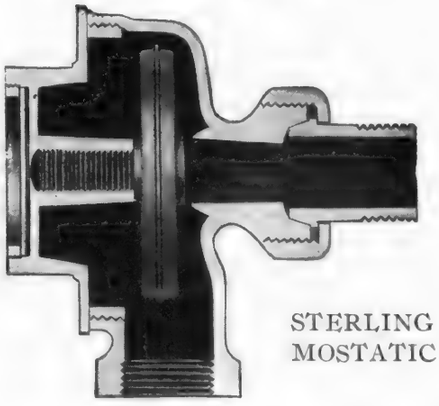

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Note the vertical self cleaning seat.

Diaphragm closes against the steam, not with it.

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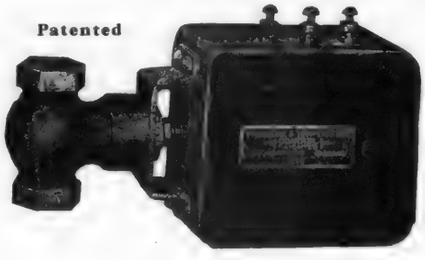

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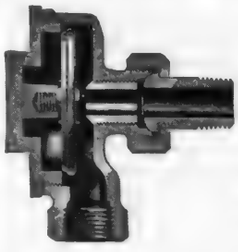

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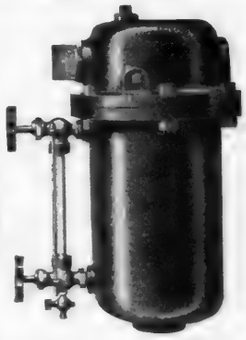
Assures a steady water line by returning condensation to the boiler against pressure. Freely removes all air, and makes vapor heating safe.



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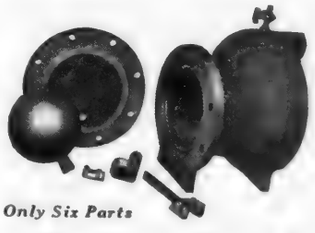

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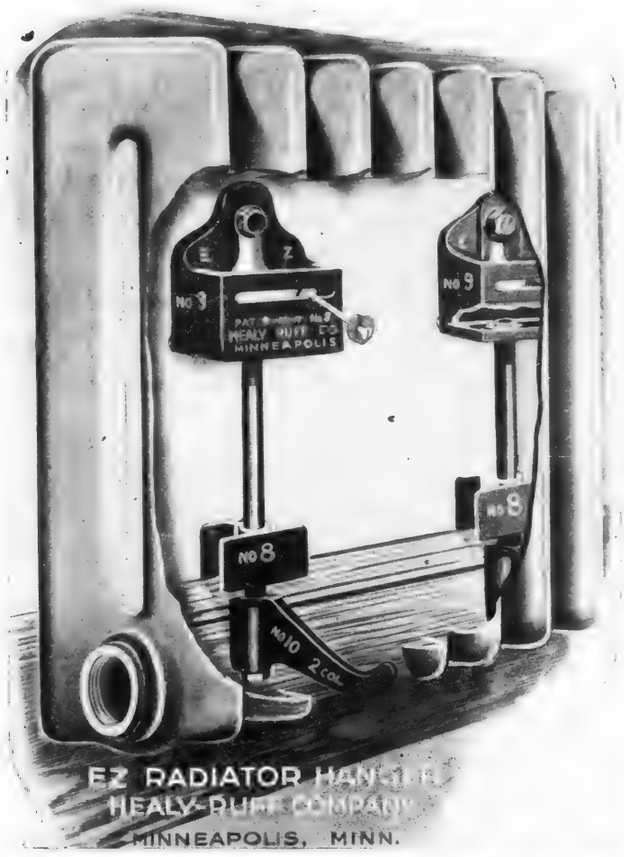

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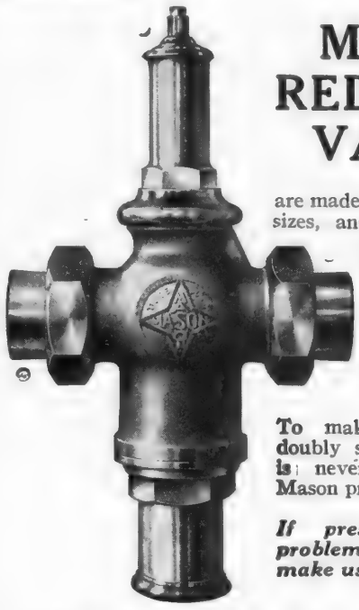

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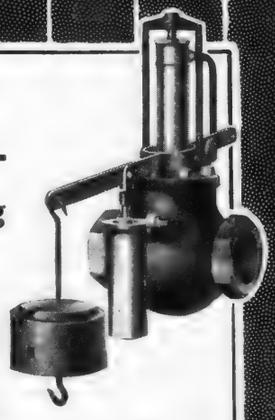
for Heating Plants



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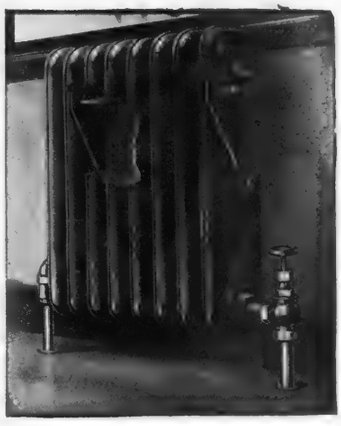

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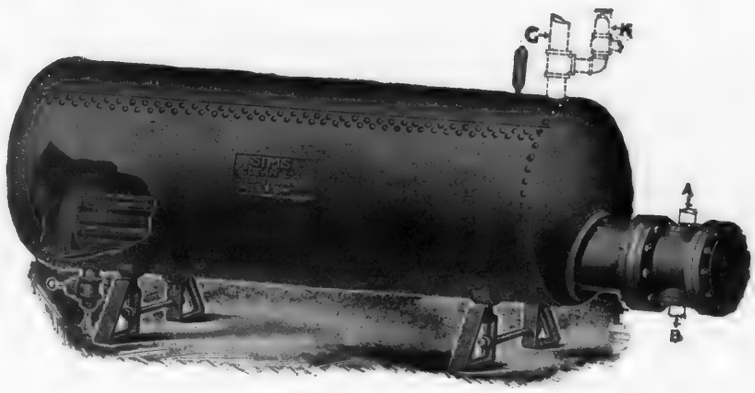

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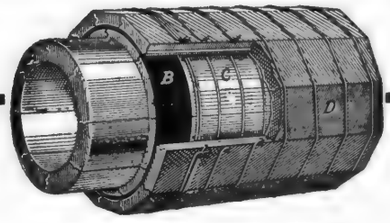

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Not affected by wet and dry conditions common to steam-pipe trenches. Will not rot. Absolutely water and steam tight. Each shell is wound with extra-heavy steel wire. Coated all over with the best known preservative—**Montezuma Asphalt.**

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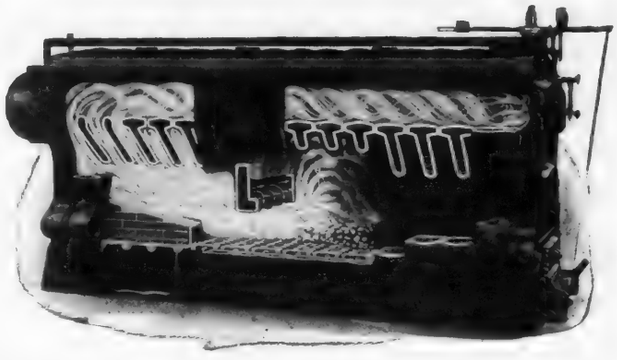

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PUMPS.

Boiler Feed.
American Steam Pump Co., Battle Creek, Mich.
Buffalo Steam Pump Co., Buffalo, N. Y.
Chicago Pump Co., Chicago, Ill.
Nash Engineering Co., So. Norwalk, Conn.
Plant Eng'g & Equipment Co., New York.
Wright-Austin Co., Detroit, Mich.
Yeomans Bros., Chicago, Ill.
Young Pump Co., Michigan City, Ind.

Centrifugal.
Alberger Pump & Condenser Co., New York.
Allenclif Engineering Co., Columbus, O.
American Steam Pump Co., Battle Creek, Mich.
Buffalo Steam Pump Co., Buffalo, N. Y.
Chicago Pump Co., Chicago, Ill.
Economy Pumping Machinery Co., Chicago, Ill.
Nash Engineering Co., So. Norwalk, Conn.
Plant Engineering & Equipment Co., New York.
Sprague Electric Works, New York
Thomas Pump Works, New York.
Yeomans Bros. Co., Chicago, Ill.
Young Pump Co., Michigan City, Ind.

Condensation.
American Steam Pump Co., Battle Creek, Mich.
Allenclif Engineering Co., Columbus, O.
Chicago, Pump Co., Chicago, Ill.
Economy Pumping Machinery Co., Chicago, Ill.
Ideal Heating Equipment Co., Cleveland, O.
Nash Engineering Co., So. Norwalk, Conn.
Thomas Pump works, New York.
Thompson Mfg. Co., Des Moines, Ia.
Trane Co., La Crosse, Wis.
Wright-Austin Co., Detroit, Mich.
Yeomans Bros. Co., Chicago, Ill.

Rotary.
Connersville Blower Co., Connersville, Ind.
Nash Engineering Co., So. Norwalk, Conn.
Thomas Pump Works, New York.
Thompson Mfg. Co., Des Moines, Ia.
United Vacuum Appliance Division, Connersville, Ind.
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

Steam.
American Steam Pump Co., Battle Creek, Mich.
Buffalo Steam Pump Co., Buffalo, N. Y.
Ideal Heating Equipment Co., Cleveland, O.
Nash Engineering Co., So. Norwalk, Conn.
Plant Engineering & Equipment Co., New York.

Turbine.
Alberger Pump & Condenser Co., New York.
Buffalo Steam Pump Co., Buffalo, N. Y.
Nash Engineering Co., So. Norwalk, Conn.
Yeomans Bros., Chicago, Ill.

Vacuum.
American Steam Pump Co., Battle Creek, Mich.
Bishop & Babcock Co., Cleveland, O.
Buffalo Steam Pump Co., Buffalo, N. Y.
Chicago Pump Co., Chicago, Ill.
Connersville Blower Co., Connersville, Id.
Economy Pumping Machinery Co., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
Nash Engineering Co., So. Norwalk, Conn.
Trane Co., La Crosse, Wis.
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.
Yeomans Bros., Chicago, Ill.
Young Pump Co., Michigan City, Ind.

PYROMETERS.

Taylor Instrument Cos., Rochester, N. Y.
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

RADIATOR HANGERS.

Gloeckle, Jr., A. F., Rochester, N. Y.
Hartman Co., Chas., Brooklyn, N. Y.
Healy-Ruff Co., Minneapolis, Minn.

RADIATORS, STEAM AND WATER.

American Radiator Co., Chicago, Ill.
Gurney Heater Mfg. Co., Boston, Mass.
International Heater Co., Utica, N. Y.
Simmons Co., John, New York.

RECEIVERS.

Air.
American District Steam Co., No. Tonawanda, N. Y.
Sterling Engineering Co., Milwaukee, Wis.

Condensation.
Allenclif Engineering Co., Columbus, O.
American Steam Pump Co., Battle Creek, Mich.
Chicago Pump Co., Chicago, Ill.
Davis Regulator Co., G. M., Chicago, Ill.
Economy Pumping Machinery Co., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
Thomas Pump Works, New York.
Yeomans Bros., Chicago, Ill.

REGULATORS.

Boiler-Feed.
McAlear Mfg. Co., Chicago, Ill.
Thomas Pump Works, New York.
National Regulator Co., Chicago, Ill.
Wright-Austin Co., Detroit, Mich.

Damper.
American Dist. Steam Co., No. Tonawanda. N. Y.
Atlas Valve Co., Newark, N. J.
American Radiator Co., Chicago, Ill.
Bishop & Babcock Co., Cleveland, O.
Davis Regulator Co., G. M., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
Moline Heat, Moline, Ill.
National Regulator Co., Chicago, Ill.
Plant Engineering & Equipment Co., New York.
Sixth City Sheet Metal Works Co., Cleveland, O.
Sterling Engineering Co., Milwaukee, Wis.
Trane Co., La Crosse, Wis.
L. J. Wing Mfg. Co., New York.

Pressure.
American District Steam Co., No. Tonawanda, N. Y.
Atlas Valve Co., Newark, N. J.
Crane Co., Chicago, Ill.
Davis Regulator Co., G. M., Chicago, Ill.
Fulton Co., Knoxville, Tenn.
Hornung, J. C., Chicago, Ill.
Illinois Engineering Co., Chicago, Ill.
McAlear Mfg. Co., Chicago.
Mason Regulator Co., Boston, Mass.
National Regulator Co., Chicago, Ill.

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Bishop & Babcock Co., Cleveland, O.
Carrier Engineering Corporation, New York.
Fulton Co., Knoxville, Tenn.
Hornung, J. C., Chicago, Ill.
Johnson Service Co., Milwaukee, Wis.
McAlear Mfg. Co., Chicago, Ill.
National Regulator Co., Chicago, Ill.
Powers Regulator Co., Chicago, Ill.
Sarco Co., New York.
Taylor Instrument Cos., Rochester, N. Y.

SEPARATORS.
OIL.
Griscom-Russell Co., New York.
Wright-Austin Co., Detroit, Mich.
STEAM.
American District Steam Co., No. Tonawanda, N. Y.
Bishop & Babcock Co., Cleveland, O.
Crane Co., Chicago, Ill.
Griscom-Russell Co., New York.
Illinois Engineering Co., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
Patterson-Kelley Co., New York.
Plant Engineering & Equipment Co., New York.
Sims Co., Erie, Pa.
Webster & Co., Warren Camden, N. J.
Wright-Austin Co., Detroit, Mich.

SHEET METAL CONSTRUCTION.
Hartmann Co., Charles, Brooklyn, N. Y.

SPRAY COOLING SYSTEMS.
Atmospheric Conditioning Corp., Phila,, Pa.
Massachusetts Blower Co., Watertown, Mass.
Spray Engineering Co., Boston, Mass.

STACK LININGS
Johns-Manville, Inc., New York.

STRAINERS.
OIL.
Griscom-Russell Co., New York.
STEAM.
American Dist. Steam Co., No. Tonawanda, N. Y.
Illinois Engineering Co., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
Wright-Austin Co., Detroit, Mich.

THERMOMETERS, RECORDING AND INDICATING.
American Steam Gauge & Valve Mfg. Co., Boston, Mass.
Schaeffer & Budenberg Mfg. Co., Brooklyn, N. Y.
Taylor Instrument Cos., Rochester, N. Y.
WATER.
Marsh & Co., Jas. P., Chicago, Ill.

THERMOSTATS.
American Radiator Co., Chicago, Ill.
Atlas Valve Co., Newark, N. J.
Bishop & Babcock Co., Cleveland, O.
Fulton Co., Knoxville, Tenn.
Johnson Service Co., Milwaukee, Wis.
Powers Regulator Co., Chicago, Ill.
Sarco Co., New York.

TRAPS.
CONDENSER.
McAlear Mfg. Co., Chicago, Ill.
Wright-Austin Co., Detroit, Mich.
RADIATOR.
Bishop & Babcock Co., Cleveland, O.
Dole Valve Co., Chicago, Ill.
Dunham Co., C. A., Chicago, Ill.
Hoffman Specialty Co., New York .
Ideal Heating Equipment Co., Cleveland, O.
Illinois Engineering Co., Chicago, Ill.
Johns-Manville, Inc., New York.
McAlear Mfg. Co., Chicago, Ill.
Marsh & Co., Jas. P., Chicago, Ill.
Moline Heat, Moline, Ill.
Sarco Co., New York.
Sterling Engineering Co., Milwaukee, Wis.
Trane Co., La Crosse, Wis.
Webster & Co., Warren, Camden, N. J.
RETURN.
American Blower Co., Detroit, Mich.
Dunham Co., C. A., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
Ideal Heating Equipment Co., Cleveland, O.
Illinois Engineering Co., Chicago, Ill.
Jas. P. Marsh & Co., Chicago, Ill.
Sterling Engineering Co., Milwaukee, Wis.
Trane Co., La Crosse, Wis.
Webster & Co., Warren, Camden, N. J.
Wright-Austin Co., Detroit, Mich.
STEAM.
American Blower Co., Detroit, Mich.
American Steam Gauge & Valve Mfg. Co., Boston, Mass.
American District Steam Co., No. Tonawanda, N. Y.
Crane Co., Chicago, Ill.
Davis Regulator Co., G. M., Chicago, Ill.
Dunham Co., C. A ., Chicago, Ill.
Haines & Co,. Wm. S., Philadelphia, Pa.
Hoffman Specialty Co., New York.
Illinois Engineering Co., Chicago, Ill.
Jenkins Bros., New York.
Johns-Manville, Inc., New York.
McAlear Mfg. Co., Chicago, Ill.
Marsh & Co., Jas. P.. Chicago, Ill.
Patterson-Kelley Co., New York.
Plant Engineering & Equipment Co., New York.
Sarco Co., New York.
Simmons Co., John, New York.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.
Trane Co., La Crosse, Wis.
Wright-Austin Co., Detroit, Mich.
VACUUM.
American Blower Co., Detroit, Mich.
Bishop & Babcock Co., Cleveland, O.
Dunham Co., C. A., Chicago, Ill.
Hoffman Specialty Co., New York.
Ideal Heating Equipment Co., Cleveland, O.
Illinois Engineering Co., Chicago, Ill.
Marsh & Co., Jas. P., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
Mouat-Squires Co., Cleveland, O.
Sarco Co., New York.
Sterling Engineering Co., Milwaukee, Wis.
Webster & Co., Warren, Camden, N. J.
Wright-Austin Co., Detroit, Mich.

TURBINES, STEAM.
Buffalo, Forge Co., Buffalo, N. Y.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.
L. J. Wing Mfg. Co., New York.

TURBO-BLOWERS.
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.
Sturtevant Co., B. F., Hyde Park, Boston, Mass,

UNDERGROUND PIPE CONDUITS.
American District Steam Co., No. Tonawanda, N. Y.
Century Conduit Co., Pittsburgh, Pa.
Hornung, J. C., Chicago, Ill.
Johns-Manville, Inc., New York.
National Asbestos Mfg. Co., Jersey City, N. J.
Ric-Wil Co., Cleveland, O.
Wyckoff & Son Co., A., Elmira, N. Y.

VACUUM CLEANING APPARATUS.
American Radiator Co., Chicago, Ill.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.
United Vacuum Appliance Division, Connersville Id.

VALVES.
AIR (Automatic).
American Radiator Co., Chicago, Ill.
Commonwealth Brass Corporation, Detroit, Mich.
Fulton Co., Knoxville, Tenn.
Wm. S. Haines & Co., Philadelphia, Pa.
Jenkins Bros., New York.
Marsh & Co., Jas. P., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
Hoffman Specialty Co., New York.
Simmons Co., John, New York.
AIR RELIEF.
American District Steam Co., No. Tonawanda, N. Y.
Fulton Co., Knoxville, Tenn.
Jenkins Bros., New York.
McAlear Mfg. Co., Chicago, Ill.
Sterling Engineering Co., Milwaukee, Wis.
The Wm. Powell Co., Cincinnati, O.
Webster & Co., Warren, Camden, N. J.
BACK PRESSURE.
Crane Co., Chicago, Ill.
Griscom-Russell Co., New York.
Illinois Engineering Co., Chicago, Ill.
Jenkins Bros., New York.
McAlear Mfg. Co., Chicago, Ill.
Simmons Co., John, New York.
BALANCED.
American District Steam Co., No. Tonawanda, N. Y.
Atlas Valve Co., Newark, N. J.
Davis Regulator Co., G. M., Chicago, Ill.
Illinois Engineering Co., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
BLOW-OFF.
Crane Co., Chicago, Ill.
Jenkins Bros., New York.
Simmons Co., John, New York.
The Wm. Powell Co., Cincinnati, O.
CHECK.
Crane Co., Chicago, Ill.
Jenkins Bros., New York.
Kennedy Valve Mfg. Co., Elmira, N. Y.
The Wm. Powell Co., Cincinnati, O.
Simmons Co., John, New York.
GATE.
American District Steam Co., No. Tonawanda, N. Y.
Crane Co., Chicago, Ill.
Dole Valve Co., Chicago, Ill.
Jenkins Bros., New York.
Kennedy Valve Mfg. Co., Elmira, N. Y.
Marsh Valve Co., Erie, Pa.
Simmons Co., John, New York.
The Wm. Powell Co., Cincinnati, O.
GLOBE, ANGLE AND CROSS.
Crane Co., Chicago, Ill.
Dole Valve Co., Chicago, Ill.
Illinois Engineering Co., Chicago, Ill.
Jenkins Bros., New York.
Kennedy Valve Mfg. Co., Elmira, N. Y.
Marsh Valve Co., Erie, Pa.
Simmons Co., John, New York.
The Wm. Powell Co., Cincinnati, O.
HYDRAULIC-OPERATING.
Atlas Valve Co., Newark, N. J.
Crane Co., Chicago, Ill.
NON-RETURN.
Crane Co., Chicago, Ill.
Davis Regulator Co., G. M., Chicago, Ill.
Illinois Engineering Co., Chicago, Ill.
Jenkins Bros., New York.
McAlear Mfg. Co., Chicago, Ill.
Simmons Co., John, New York.
The Wm. Powell Co., Cincinnati, O.
RADIATOR.
American Radiator Co., Chicago, Ill.
American District Steam Co., No. Tonawanda, N. Y.
Atlas Valve Co., Newark, N. J.
Bishop & Babcock Co., Cleveland, O.
Commonwealth Brass Corporation, Detroit, Mich.
Crane Co , Chicago, Ill.
Detroit Lubricator Co., Detroit, Mich.
Dole Valve Co., Chicago, Ill.
Dunham Co., C. A., Chicago, Ill.
Fulton Co., Knoxville, Tenn.
Gorton & Lidgerwood Co., New York.
Gurney Heater Mfg. Co., Boston, Mass.
Ideal Heating Equipment Co., Cleveland, O.
Illinois Engineering Co., Chicago, Ill.
Jenkins Bros., New York.
Kennedy Valve Mfg. Co., Elmira, N. Y.
McAlear Mfg. Co., Chicago, Ill.
McDonald Under-Seat Valve Co., Cleveland, O.
Marsh Co., Jas. P., Chicago, Ill.
Marsh Valve Co., Erie, Pa.
Mouat-Squires Co., Cleveland, O.
Pittsburgh Engineering Co., Pittsburgh, Pa.
Simmons Co., John, New York.
Sterling Engineering Co., Milwaukee, Wis.
The Wm. Powell Co., Cincinnati, O.
Trane Co., La Crosse, Wis.
Webster & Co., Warren, Camden, N. J.
REDUCING.
American District Steam Co., No. Tonawanda, N. Y.
Atlas Valve Co., Newark, N. J.
Davis Regulator Co., G. M. Chicago, Ill.
Dunham Co., C. A., Chicago, Ill.
Fulton Co., Knoxville, Tenn.
Illinois Engineering Co., Chicago, Ill.
Jenkins Bros., New York.
Johnson Service Co., Milwaukee, Wis.
Kennedy Valve Mfg. Co., Elmira, N. Y.
McAlear Mfg. Co., Chicago, Ill.
Mason Regulator Co., Boston, Mass.
Powers Regulator Co., Chicago, Ill.
The Wm. Powell Co., Cincinnatti, O.
REGULATING.
American District Steam Co., No. Tonawanda, N. Y.
Atlas Valve Co., Newark, N. J.
Fulton Co., Knoxville, Tenn.
Hornung, J. C., Chicago, Ill.
Illinois Engineering Co., Chicago, Ill.
Jenkins Bros., New York.
McAlear Mfg. Co., Chicago, Ill.
Plant Engineering & Equipment Co., New York.
The Wm. Powell Co., Cincinnati, O.
SAFETY.
American District Steam Co., No. Tonawanda, N. Y.
Jenkins Bros., New York.
The Wm. Powell Co., Cincinnati, O.
STOP AND CHECK (See Valves, Non-Return.)

VENTILATING HEATERS.
American Blower Co., Detroit, Mich.
American Radiator Co., Chicago, Ill.
Bayley Mfg. Co., Milwaukee, Wis.
Buffalo Forge Co., Buffalo, N. Y.
Clarage Fan Co., Kalamazoo, Mich.
New York Blower Co., Chicago, Ill.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.
Massachusetts Blower Co., Watertown, Mass.

VENTILATING SYSTEMS.
American Blower Co., Detroit, Mich.
Atmospheric Conditioning Corp., Phila., Pa
Batterman-Truitt Co., Chicago, Ill.
Buffalo Forge Co. Buffalo, N. Y.
Carrier Engineering Corporation, New York.
W. L. Fleisher Co., New York, N. Y.
Hackney Mfg. Co., St. Paul, Minn.
Ilg Electric Ventilating Co., Chicago, Ill.
Massachusetts Blower Co., Watertown. Mass
Moline Heat, Moline, Ill.
New York Blower Co., Chicago, Ill.
Skinner Bros. Mfg. Co., St. Louis, Mo.
Sprague Electric Works, New York
Sturtevant Co., B. F., Hyde Park, Boston, Mass
L. J. Wing Mfg. Co., New York.

VENTILATORS.
Allen Air-Turbine Ventilator Co., Detroit, Mich
Buffalo Forge Co., Buffalo, N. Y.
Buckeye Blower Co., Columbus, O.
Johns-Manville Co., H. W., New York.
New York Blower Co., Chicago, Ill.
Sturtevant Co., B. F., Hyde Park, Boston. Mass,
L. J. Wing Mfg. Co., New York.
MUSHROOM.
Hersh Brothers Co., Allentown, Pa.
Knowles Mushroom Ventilator Co., New York
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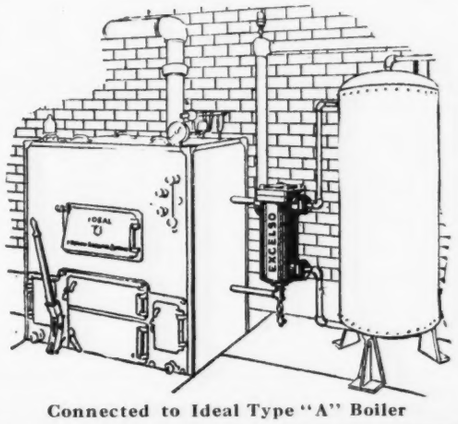

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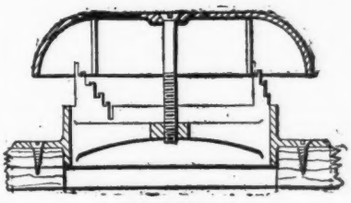
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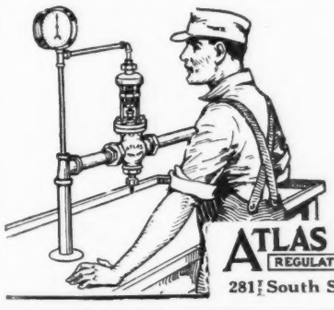

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Pressure Regulators
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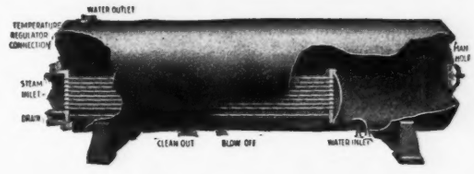

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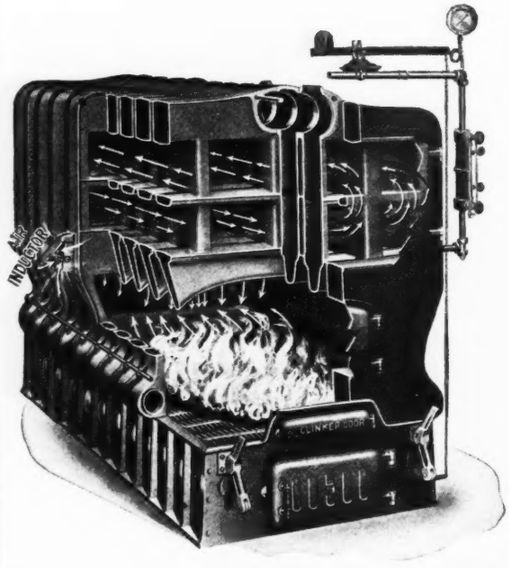

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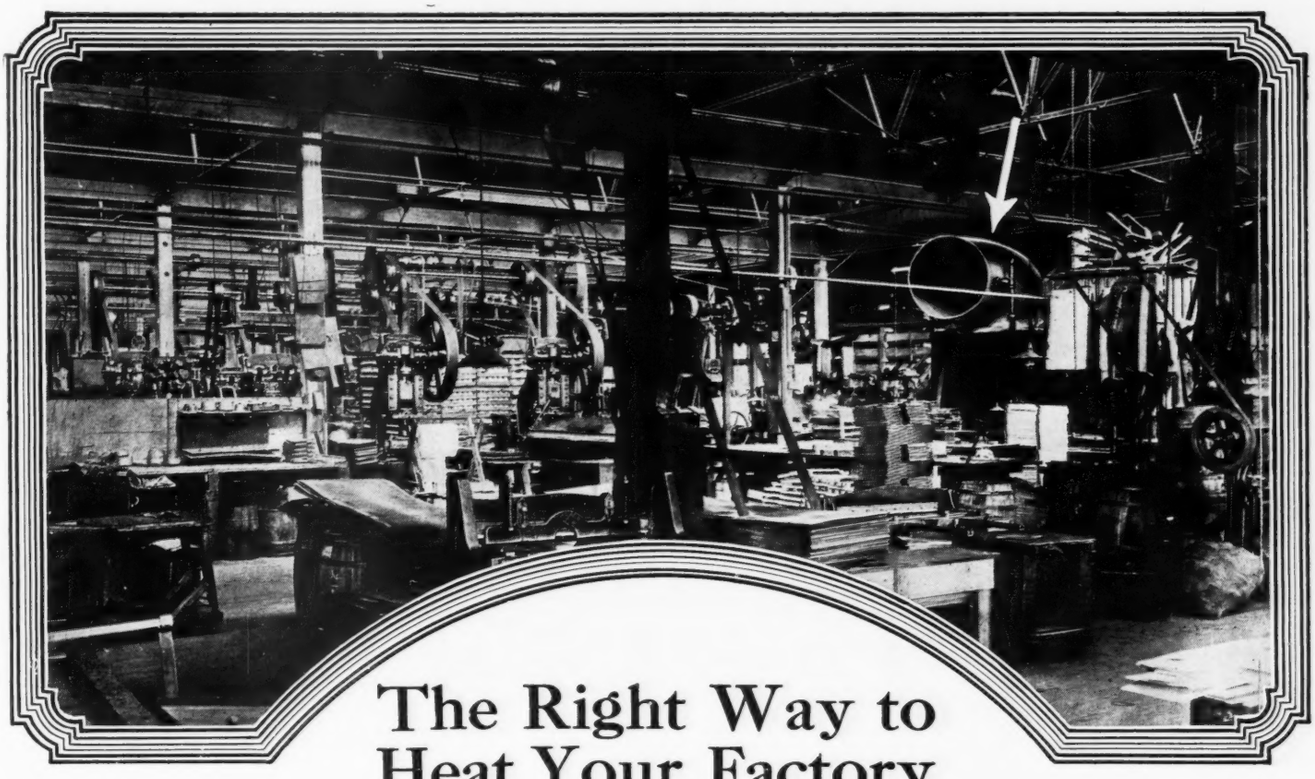
FACTORY: Meadville, Pa.

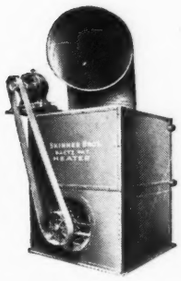
MAKERS OF A COMPLETE LINE OF ROUND AND SQUARE BOILERS FOR EVERY CLASS OF BUILDING



The Right Way to Heat Your Factory

Install a Skinner Bros. (Baetz Patent) Heating System and there will be no more hot or cold spots in your factory—it will be comfortably warm all over all of the time, regardless of weather conditions. This is the right method of factory heating.

Skinner Bros. (Baetz Patent) Heaters do away with complicated pipes or ducts, are portable and require no special foundations. As a result, installation cost is 15% to 50% less than any other system, with equally low operating costs. The mild, gentle circulation of warmed air provided by this heater does not create drafts or establish other conditions injurious to the health and welfare of your employees. Satisfactory performance guaranteed on a money refund basis.



Type SC—Where Steam is Available

Consists of a series of steam coils compactly mounted in an enclosed case, above a powerful fan-wheel. Cold air at the floor level or from outside is drawn into the heater by the fan, heated, and then distributed through outlet hoods to every corner of the open space. Uses live or exhaust steam. Fan operated by any power available.

Get Further Information and List of Users

Send now for further details on this wonderful heating system and list of users—you can then make your own investigation. Use the coupon, please.

Skinner Bros. Mfg. Co., Inc.

1426 South Vandeventer Ave. St. Louis, Mo.

Boston.....455 Little Bldg. Chicago.....1514 Fisher Bldg.
Buffalo.....712 Morgan Bldg. Indianapolis..336 Occidental Bldg.
Cleveland.....622 Marshall Bldg. New York.....1712 Flatiron Bldg.
Minneapolis...812 Metropolitan Life Bldg.

Type DF—Where Steam is Not Available

Construction is similar to that of Type SC, except that steam coils are replaced by a heavy cast iron fire-pot. Burns coal, coke or wood—no more trouble than an ordinary furnace. Cold air is forced around the surface of the heated fire-pot and then gently diffused through outlet hoods into the open building space.

SkinnerBros.
Baetz Patent HEATING SYSTEM

Skinner Bros. Mfg. Co., Inc.
1426 S. Vandeventer Avenue, St. Louis, Mo.

Please send complete details on Skinner Bros. (Baetz Patent) Heaters to

Firm .....

Address .....

Building used for.....

We can / cannot use steam.

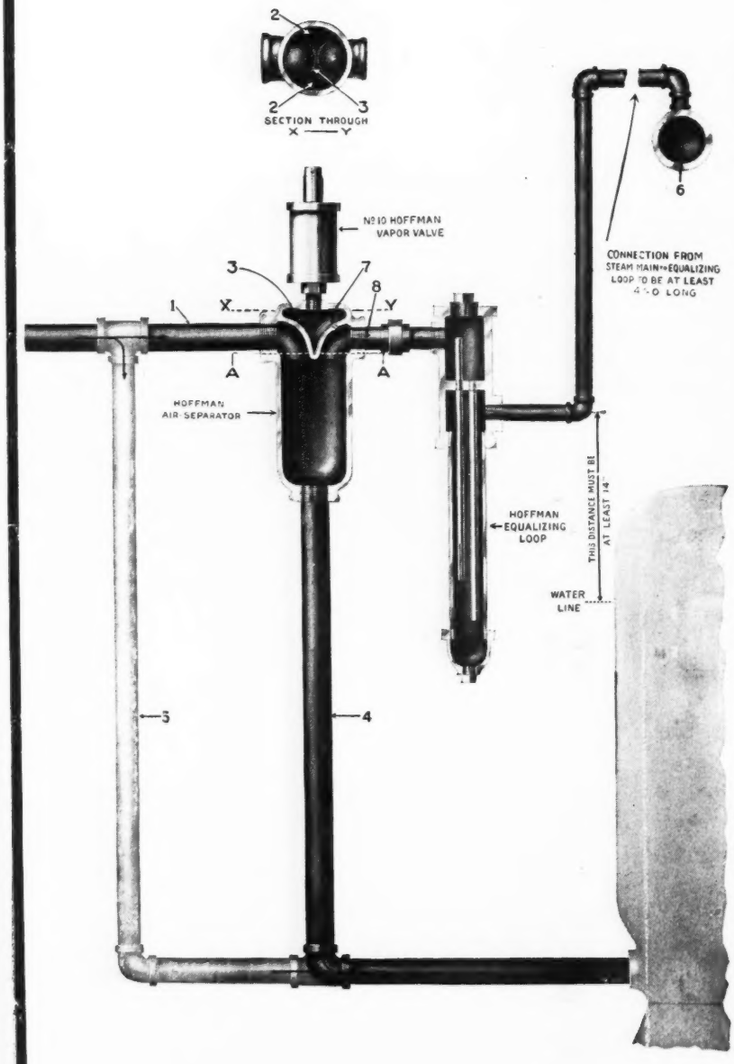
The Simple Hoffman Method

: : OF : :

Water Line Control

: : IN : :

Vapor or Vapor-Vacuum Systems



Various complicated ways have been tried to maintain a constant boiler water line in vapor or vapor vacuum systems, likewise the separation of air and condensation.

The Hoffman Equalizing Loop employs the simple principle of a water column which seals a connection between the steam and return main. Whenever the differential pressure between the two mains is such that water would back up in the return main, the water seal is blown over and a small quantity of steam delivered to the return main closing the thermostatic vent valve, thereby causing pressure to build up until the required differential is restored.

The Hoffman Air Separator uses a simple yet effective principle in abruptly changing the direction of flow of air and condensation, deflecting them into an enlarged chamber where separation takes place because of the different gravities of the two elements.

May we send you our new pocket catalogue describing the operations of these devices in detail?

HOFFMAN SPECIALTY COMPANY

Main Office and Factory: Waterbury, Connecticut

Boston **New York** **Chicago** **Los Angeles**